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Why Do Emerging Economies Borrow Short Term?

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Abstract

We argue that emerging economies borrow short term due to the high risk premium charged by international capital markets on long-term debt. First, we present a model where the debt maturity structure is the outcome of a risk-sharing problem between the government and bondholders. By issuing long-term debt, the government lowers the probability of a liquidity crisis, transferring risk to bondholders. In equilibrium, this risk is reflected in a higher risk premium and borrowing cost. Therefore, the government faces a trade-off between safer long-term borrowing and cheaper short-term debt. Second, we construct a new database of sovereign bond prices and issuance. We show that emerging economies pay a positive term premium (a higher risk premium on long-term bonds than on short-term bonds). During crises, the term premium increases, with issuance shifting toward shorter maturities. This suggests that changes in bondholders' risk aversion are important to understand emerging market crises.

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1 Introduction

During the last decade, emerging economies have experienced recurring financial crises. A common factor across many of these crises has been a maturity mismatch between assets and liabilities in the affected countries.[1] There is broad consensus by now that when countries rely excessively on short-term borrowing they are more vulnerable to sudden reversals of capital flows and liquidity crises. The risks associated with heavy reliance on short-term debt have prompted several authors to suggest that countries should decrease their vulnerability to capital inflow reversals by lengthening the maturity structure of their liabilities. This view is espoused in Cole and Kehoe (1996), Sachs, Tornell, and Velasco (1996), Furman and Stiglitz (1998), Obstfeld (1998), Radelet and Sachs (1998), Corsetti, Pesenti, and Roubini (1999), Eichengreen and Hausmann (1999), and Feldstein (1999).

Why do emerging economies borrow short term despite its associated risks? In this paper, we argue that countries borrow short term because it is cheaper than borrowing long term. In particular, we show that international capital markets require a high risk premium when emerging economies issue long-term debt, and that the required risk premium is especially high when crises approach.[2] Therefore, countries are forced to balance the cost of a liquidity crisis against the cost of long-term borrowing. In this context, the observed debt maturity could simply be the result of optimal risk sharing between the debtor country and investors holding emerging market bonds. Empirically, we show that the cost of issuing long-term debt is, on average, higher than the cost of issuing short-term debt, and the difference between the two is higher during periods of financial turmoil. Furthermore, we show that there is a negative relation between the relative cost of long versus short-term borrowing and the maturity of new debt issued, i.e. when long-term debt becomes relatively expensive countries issue more short-term debt.

In this paper, we use a simple model to illustrate our argument and present empirical evidence consistent with our explanation. In the model, the optimal debt maturity structure and risk premia

[1] For example, large amounts of short-term debt had been accumulated by governments prior to the crises of Mexico 1994-95, Russia 1998, and Brazil 1998-99, and by the private sector in Indonesia, South Korea, and Thailand before the 1997 East Asian crisis. According to central bank sources, the average maturity of outstanding government bonds in Brazil was 1.7 years in 1998. In the cases of South Korea and Thailand, short-term debt (maturing at most in five years) was, respectively, 97 and 60 percent of total corporate bonds outstanding in 1997.

[2] This paper is related to other papers in the international finance literature that have stressed the importance of international investors to understand emerging market crises. See, for example, Calvo and Mendoza (2000), Kaminsky and Reinhart (2000), Caballero and Krishnamurthy (2001, 2003), and Chang and Velasco (2001).

at different maturities are endogenously determined. The model illustrates the trade-off between cheaper short-term borrowing and safer long-term borrowing. On the one hand, investors are risk averse and have a short horizon, so they may need to liquidate the long-term bonds before maturity. As a result, they require a positive term premium to hold long-term bonds. On the other hand, it is costly for the country to generate large amounts of liquidity (or fiscal revenue) in a short period of time. Therefore, long-term debt is safer for the government because it reduces the expected cost associated with rolling over short-term bonds.

The model has several implications. First, it shows that the risk premium on long-term bonds is higher than the risk premium on short-term bonds, and that this difference increases during crises. Second, the model shows what types of shocks are consistent with the observed pattern of maturity choice and premia at different maturities. A negative shock to government resources leads to an increase in the risk premium on long-term bonds and an increase in the maturity structure of bond issues. This is analogous to a positive demand shock on the market for international loans, leading to higher prices and higher quantities of long-term bonds. A negative shock to investors' wealth, on the other hand, leads to an increase in the risk premium on long-term bonds and a decrease in the maturity structure of bond issues. This is analogous to a negative supply shock, leading to higher prices and lower quantities of long-term bonds.

Empirically, the paper studies the behavior of bond prices and quantities. To do so, we assemble a new database on bond prices for several emerging economies. We use this database to estimate time series of the term premium for each emerging market. In the process, we also estimate spreads, bond returns, and risk premia at different maturities, relative to Germany and the United States (considered to be "safe" countries). We also study the characteristics of bond issuance by emerging economies to understand the relation between the cost of borrowing at different maturities and the maturity choice.

The main empirical results can be summarized in three stylized facts. First, when compared with Germany and the United States, the excess returns from holding emerging market long-term bonds are, on average, much higher than those from holding emerging market short-term bonds. In other words, there is a high "term premium" of around 4 percentage points per year, when comparing 3-year and 12-year maturities.[3] This high term premium reflects the high risk premium required by

[3] To be precise, the term premium is equal to the difference between the risk premium an emerging economy pays

investors to hold long-term debt relative to short-term debt. Second, the term premium is around 30 percentage points higher, on an annual basis, in crisis periods than in non-crisis periods. Third, emerging economies issue relatively more short-term debt during periods of financial turmoil, and wait for tranquil times to issue long-term debt. This suggests not only that the high term premium shortens the average maturity structure, but also that time variations in the term premium lead countries to shorten their maturity structure even more during crises.

In sum, the theoretical and empirical results of this paper suggest that the "investor side" is important to understand the joint behavior of risk premia and maturity structure of emerging market debt. In particular, given our observation that the term premium increases, while the maturity of bonds issued decreases during periods of financial turmoil, we conclude that changes in investors' risk aversion play an important role in emerging market crises.

Three issues are worth considering when analyzing the results of this paper. First, the term premium is not the same thing as the difference in spreads at different maturities. The reason is that emerging market debtors sometimes default on their debt. Observed spreads can then be decomposed in two parts, a default premium and a risk premium. The default premium simply reflects the probability of default at different horizons. The risk premium reflects the fact that investors need to be compensated for bearing the risk of default and for the price volatility associated with bonds of different maturity.[4] The yields on long-term bonds may be higher than those on short-term bonds either because the probability of default at longer horizons is higher or because the expected returns required by investors are higher. To study the cost of borrowing at different maturities we need to identify these two components. We do this by estimating excess returns that account for default episodes.

A second and related issue is that estimating the risk premium on defaultable bonds using realized returns can be subject to a "peso problem," given that defaults are relatively rare events. However, because our primary objective is to study the difference between long and short-term

on long-term debt (relative to Germany and the U.S.) and the risk premium it pays on short-term debt (again, relative to Germany and the U.S.). This difference can be called excess term premium, due to the comparison with Germany and the U.S. To simplify, however, we will just use the expression term premium throughout the paper, with the understanding that we study the yields that emerging economies pay on top of those charged to Germany and the U.S.

[4] Chang and Velasco (2000) also make this distinction. They present a model where the term premium is zero (bondholders are risk neutral) even though short-term spreads are lower than long-term spreads. In their model, the probability of default on long-term bonds is higher than the probability of default on short-term bonds.

risk premia, we argue that it is very unlikely that our results are affected by a peso problem. The bias affects both elements of the difference. Plus, if anything, the bias should affect the returns on short-term bonds more than those on long-term bonds, tilting the results against finding a large term premium.[5]

Third, though our evidence points toward the importance of the investor side in understanding short-term debt, other factors are also likely to be relevant in explaining the recurrent use of short-term debt by emerging economies. In fact, several authors have emphasized the role of debtors, arguing that short-term debt can alleviate moral hazard problems. The early literature, such as Calvo (1988) and Blanchard and Missale (1994), focuses on the government incentive to lower the real value of public debt by creating inflation. These papers show that this incentive is higher when the debt is non-indexed, in domestic currency, and of long-term nature. More recent work by Rodrik and Velasco (1999) and Jeanne (2000) show that opportunistic governments have less incentive to default on their debt and more incentive to carry out revenue-raising reforms when they have to meet early debt repayments. In this context, short-term debt serves as a commitment device for the debtor to lower the borrowing cost.[6]

The rest of the paper is organized as follows. Section 2 presents a model that highlights the trade-off between issuing short and long-term debt. Section 3 describes the data. Section 4 studies the behavior of the term premium. Section 5 analyzes the pattern of long and short-term debt issuance. Section 6 concludes.

2 The model

In this section, we present a model of the joint determination of the debt maturity structure and the risk premium at different maturities. The model describes the government of an emerging economy that borrows from a set of international investors.[7] We assume that it is costly for the

[5] As discussed below, in Section 4, our argument is that defaults generate larger losses on short-term bonds than on long-term bonds. The reason is that long-term bonds usually trade at larger discounts during times of financial turbulence, while post-default workouts usually involve payments proportional to face value.

[6] Caballero and Krishnamurthy (2001) discuss the welfare consequences of short-term and long-term debt and show that financial underdevelopment can result in underinsurance from a social point of view and, thus, in too much short-term borrowing.

[7] In the presentation of the model, we refer to bondholders as international investors, but the results apply more generally to any environment where the government cares about borrowing costs. It is simpler to model bondholders as international investors because in that case their utility does not enter the government's objective function.

government to raise a large amount of revenue in a short period of time. This assumption implies that short-term borrowing may result in a costly liquidity crisis due to rollover difficulties. We also assume that international investors are risk averse and have short horizons. These two assumptions make investors sensitive to the price risk associated with long-term bonds.[8]

In this environment, the maturity structure of sovereign debt can be interpreted as the outcome of a risk sharing problem between the government and bondholders. By issuing long-term debt, the country lowers the expected cost of a liquidity crisis arising from rollover difficulties, but, at the same time, it transfers risk to bondholders. In equilibrium, this risk is reflected in a higher risk premium and lower bond prices, thereby increasing the cost of borrowing for the country. Thus, the model allows us to analyze the trade-off between safer long-term borrowing and cheaper short-term borrowing.

The model predicts that the term premium (i.e. the difference between the risk premium on long-term bonds and that on short-term bonds) should be positive on average. Moreover, the term premium should be higher during financial crises. The model also predicts that debt issuance should shift toward shorter maturities when crises are due to an increase in bondholders' risk aversion. On the other hand, debt issuance should move toward longer maturities when crises are due to a decrease in the country's expected repayment capacity.

2.1 Debtor country

There are three periods, dated 0, 1, and 2. In period 0, the government must borrow D_0 to finance old debt coming to maturity. The government can sell either short-term (one-period) or long-term (two-period) bonds. In period 1, the government pays off the short-term bonds issued in period 0 and issues new short-term bonds. The difference between the two is covered by a short-run fiscal adjustment. In period 2, which represents the long run, the government has access to a stochastic and exogenous amount of fiscal revenue. This revenue is used to pay back maturing long and short-term bonds, to reduce taxation, or for public spending. We abstract from strategic default

[8] Assuming short horizons is the easiest way of having investors care about short-run returns. Even if investors were long-lived, they would also care about short-run returns if they were subject to liquidity shocks. The qualitative results of the model do not depend on this modelling choice. For a discussion on the type of environment where price risk matters, see Holmström and Tirole (2001).

by assuming that the government repays its debt whenever feasible.[9]

In period 0, the government's budget constraint is

$$D_0 = p_S D_S + p_L D_L,$$

where D_S and D_L are the amount of short and long-term bonds issued in period 0, with p_S and p_L being their respective prices.

In period 1, the government has to roll over the stock D_S of short-term bonds. The government's budget constraint in period 1 is

$$D_S = x + p_{S,1} D_{S,1},$$

where $D_{S,1}$ is the amount of short-term bonds issued in period 1, $p_{S,1}$ is their price, and x is the government's primary surplus in period 1. Short-term bonds issued in period 1 are junior to existing long-term bonds.

In period 2, the government's potential revenue equals $\tilde{Y}$, which is a random variable that can take two values, Y in the good state and 0 in the bad state. The extreme case of zero realization in the bad state simplifies the analysis because it eliminates the possibility of partial default. As of period 0, the probability of being in the good state is π_0. In period 1, there is a shock that affects the probability of being in the good state. The updated probability is denoted by π. As of period 0, π is a random variable distributed on $[\underline{\pi}, \overline{\pi}]$, with mean π_0. As we show below, the volatility of π introduces uncertainty in the government's ability to borrow in period 1 and, thus, on the required fiscal adjustment. Issuing long-term bonds in period 0 is a way for the government to insure against this uncertainty.

The government's objective function is

$$W = E_0 \left[-C(x) + \max \left\{ \tilde{Y} - D_L - D_{S,1}, 0 \right\} \right],$$

where $C(x)$ is a strictly convex function that represents the cost of the short-term fiscal adjustment.

[9] We are implicitly assuming that default is costly. The costs can be reputational, or involve direct interference by creditors on debtors' transactions in international goods and capital markets. See Bulow and Rogoff (1989) for a discussion of the latter.

We assume that $C(0) = 0$ and $C'(0) = 1$. Since C is strictly convex, $C'(x) > 1$ for $x > 0$.[10] This assumption, together with the assumption that in the long run the government's marginal utility is always equal to 1, results in short-run fiscal adjustments being more costly than long-run fiscal adjustments. This difference can be explained by the fact that, in the long run, the government can spread the adjustment over a longer period of time and thus achieve better tax smoothing, or that by better preparing for the adjustment its associated cost can be reduced.

We assume that government resources satisfy $\pi_0 Y - D_0 > 0$, so that, at risk-neutral prices, the government is solvent with no need of fiscal adjustment in period 1. We also assume that the government can carry out a fiscal adjustment large enough and faces a cost of default high enough, such that it never defaults in period 1.[11] When $x > 0$, the country faces a rollover crisis.

2.2 Investors and bond prices

There are two overlapping generations of investors, period 0 and period 1 investors. Period t investors invest in period t and consume in period $t+1$. Both generations have mass 1. Period 0 investors have initial wealth w. They invest in three assets: an international risk-less asset, which is offered at price 1 (e.g. U.S. Treasury bills), and short and long-term bonds issued by the government in period 0. Their preferences are represented by the utility function $E_0[u(c)]$, where $u(\cdot)$ is increasing, concave, and displays decreasing absolute risk aversion.[12] Their budget constraint is

$$\begin{aligned} w &= b + p_S d_S + p_L d_L, \\ c &= b + d_S + p_{L,1} d_L, \end{aligned}$$

where b denotes holdings of the international risk-less bond, and d_S and d_L denote holdings of short and long-term bonds issued by the country. Note that the period 1 budget constraint reflects the

[10] We are implicitly assuming that optimal smoothing of fiscal distortions between periods 1 and 2 is attained at $x = 0$. It is easy to generalize the model to the case where $C'(x) = 1$ is satisfied for $x \neq 0$.

[11] This is likely the simplest setup in which the trade-off emphasized in this paper can be studied. The fact that default never takes place in period 1 simplifies the pricing of bonds in period 0. However, even if default in period 1 was allowed, short-term bonds would remain less risky than long-term bonds from the point of view of investors, since the default would affect both short- and long-term bonds. In addition, the fact that the fiscal adjustment in period 1 does not affect fiscal resources in period 2 rules out multiple equilibria. The possibility of self-fulfilling "runs" would increase the relative benefits of issuing long-term bonds, but would not affect the results qualitatively.

[12] This implies that lower levels of wealth are associated with higher levels of investors' risk aversion. When referring to negative shocks to the supply of funds, we use the two indistinctively.

assumption that the government never defaults on short-term bonds issued in period 0.

Period 1 investors can purchase the international risk-less asset, short-term bonds issued in period 1, and long-term bonds issued in period 0, with remaining maturity of one period. We make the simplifying assumption that period 1 investors are risk neutral. As a result, bond prices in period 1 are equal to the probability of the good state

$$p_{L,1} = p_{S,1} = \pi,$$

which does not depend on the debt maturity structure chosen by the government in period 0. This simplifies the government's problem in period 0.

This setup reflects an environment where the market for emerging market debt is segmented and investors are specialists, subject to liquidity shocks. Segmented markets result in bondholders being more affected by movements in the country's bond prices than would be suggested by the size of this market as a fraction of world assets. Therefore, the cost of borrowing is affected by the wealth and risk aversion of specialized investors.[13] In addition, the existence of short investment horizons makes investors sensitive to the price risk of long-term bonds, since they need to liquidate their portfolios in period 1.[14]

Using the market clearing conditions $d_S = D_S$, $d_L = D_L$, and bond prices in period 1, we can obtain the consumption level of period 0 investors,

$$c = w + (1 - p_S)\, D_S + (\pi - p_L)\, D_L.$$

The period 0 first order conditions are $E\left[u'\left(w + (1 - p_S)\, D_S + (\pi - p_L)\, D_L\right)(\pi - p_L)\right] = 0$ and $1 - p_S = 0$. These conditions imply that bond prices satisfy $E\left[u'\left(w + (\pi - p_L)\, D_L\right)(\pi - p_L)\right] = 0$, what defines implicitly the price of long-term bonds as a function of D_L, $p(D_L)$. This leads us to the following lemma.

Lemma 1. *The price of long-term bonds, $p(D_L)$, satisfies $p(D_L) \leq \pi_0$, where the condition holds as an equality if and only if $D_L = 0$. Furthermore, $p(D_L)$ is decreasing in D_L.*

[13] Caballero and Krishnamurthy (2003) also model foreign lenders as specialists with limited wealth.

[14] In a previous version of the paper, we considered a model with long-lived investors subject to liquidity shocks in period 1. The results were very similar to those in this version of the paper.

Proof: See Appendix A.

The lemma implies that the risk premium on long-term bonds, which equals $\frac{E_0[p_{L,1}]-p_L}{p_L} = \frac{\pi_0 - p_L}{p_L}$, is generally positive. Since the risk premium on short-term bonds equals zero (they are risk-less), the lemma also implies the existence of a positive term premium. The intuition behind this result is straightforward. Shocks to expected revenues make the price of long-term bonds in period 1 volatile. Since investors care about short-run returns, they require a positive risk premium to hold long-term bonds to compensate for this price risk. Since the degree of exposure to price risk increases with D_L, higher levels of D_L lead to a higher risk premium and a lower price $p(D_L)$.[15]

It is useful to discuss the importance of different assumptions for the results. The two assumptions necessary for the existence of a positive term premium are: the period 1 shock to expected revenues and investors' short horizon. If the shock to expected revenues occurred after period 1, the price of long-term bonds would not change between periods 0 and 1, $p_{L,1} = p_L$, so investors would not require a positive risk premium to hold them. In addition, if investors did not care about short-run returns, they would require the same risk premium to hold long-term bonds (between periods 0 and 2) as they would to hold short-term bonds (between periods 0 and 1, and then between periods 1 and 2). The reason is that both strategies would pay out the same amount in all states of nature in period 2. On the other hand, the assumptions that no default takes place in period 1 and that investors are risk neutral between periods 1 and 2 substantially simplify the analysis of the model, but are not necessary for the results. In a more general setting in which the country can default in the intermediate period, the risk premium on short-term bonds would also be positive. However, it would still be lower than the risk premium on long-term bonds, since the risk premium on long-term bonds would reflect not only the default risk in the intermediate period, but also the price risk.

[15] The yield on long-term bonds, $\frac{1-p_L}{p_L}$, equals the sum of their risk premium, $\frac{\pi_0-p_L}{p_L}$, plus their default premium, $\frac{1-\pi_0}{p_L}$.

2.3 Optimal maturity and risk sharing

We turn now to the choice of D_L by the government. Using the bond prices derived in the previous section, the government problem can be written as,[16]

$$\begin{aligned}
\max_{D_L, D_S, D_{S,1}, x} \quad & E_0 \left[-C(x) + \pi \left(Y - D_L - D_{S,1} \right) \right], \\
\text{s.t.} \quad & D_0 = D_S + p_L D_L, \\
& x = D_S - \pi D_{S,1}, \\
& D_{S,1} \leq Y - D_L, \\
& E \left[u' \left(w + (\pi - p_L) D_L \right) (\pi - p_L) \right] = 0.
\end{aligned}$$

We can solve this problem backward, solving first the optimization problem in period 1. The maximum amount of short-term debt that the government can issue in period 1 is given by $Y - D_L$, which is valued at $\pi (Y - D_L)$. If $\pi (Y - D_L) \geq D_S$, the government can raise enough funds to repay maturing short-term bonds without any fiscal adjustment. In this case, it sets $x = 0$ and issues an amount $D_{S,1} = D_S / \pi$ of short-term bonds in period 1. The value of short-term liabilities is constant over time and the government expected payoff is $\pi (Y - D_L) - \pi D_{S,1} = \pi (Y - D_L) - D_S$.

When $\pi (Y - D_L) < D_S$, a fiscal adjustment is needed to avoid default. Since $C'(x) > 0$ for $x > 0$, it is optimal to set $D_{S,1}$ to its maximum level to minimize the fiscal adjustment. The government then sets $x = D_S - \pi (Y - D_L)$ and the expected payoff is $-C(x)$.

The government's objective function as of period 1 depends only on the value of its net resources $\pi (Y - D_L) - D_S$. We thus define the government's indirect utility function, $V(\cdot)$, as

$$V \left(\pi (Y - D_L) - D_S \right) = \begin{cases} \pi (Y - D_L) - D_S & \text{if } \pi (Y - D_L) - D_S \geq 0 \\ -C \left(- \left(\pi (Y - D_L) - D_S \right) \right) & \text{if } \pi (Y - D_L) - D_S < 0 \end{cases}$$

The function $V(\cdot)$ is increasing and concave. Using the fact that $D_0 = D_S + p_L D_L$, we can rewrite

[16] The constraint on $D_{S,1}$ is due to the fact that short-term bonds issued in period 1 are junior to long-term bonds. Without this constraint, the government could pledge all period 2 output to short-term bond holders. As a result, in equilibrium the government would not be able to issue any long-term bonds in period 0.

the government's problem in period 0 as

$$\begin{array}{ll} \max\limits_{D_L} & E\left[V\left(\pi Y - D_0 - \left(\pi - p_L\right) D_L\right)\right] \\ \text{s.t.} & E\left[u'\left(w + \left(\pi - p_L\right) D_L\right)\left(\pi - p_L\right)\right] = 0. \end{array}$$

Written in this form, the government's maturity choice in period 0 has the features of a risk-sharing problem. The problem can be thought as one in which the government has a utility function $V(\cdot)$ over period 1 "consumption," needs to invest D_0 in period 0 to finance a risky project that pays πY in period 1, and borrows from risk-averse investors by issuing bonds that pay 1 in every state (i.e. short-term bonds) and bonds that pay π (i.e. long-term bonds). The government's "consumption" level is given by

$$C_G = \pi Y - D_0 - (\pi - p_L) D_L.$$

If the government issued only short-term bonds, it would hold all the risk and C_G would be very sensitive to π. Given the concavity of $V(\cdot)$, this volatility of C_G would be costly, reflecting a higher likelihood and size of fiscal adjustment. Thus, the government has incentives to issue long-term bonds to transfer some of this risk to investors.[17] However, investors require a risk premium to bear the price risk associated with long-term bonds. Since investors' period 1 consumption equals $w + (\pi - p_L) D_L$, their exposure to π is proportional to D_L. The higher D_L, the higher the risk premium required by investors and the lower the price p_L. This implies that the expected level of government consumption, which equals $E[C_G] = \pi_0 Y - D_0 - (\pi_0 - p_L) D_L$, is decreasing in D_L. As a result, the government trades-off the insurance benefits associated with long-term bonds against the lower borrowing cost associated with short-term bonds.

2.4 Comparative statics: supply and demand factors

We now characterize how the optimal maturity structure and the risk premium on long-term bonds depend on the characteristics of investors and the borrower country. We refer to supply and demand as supply and demand of funds in international capital markets: international investors are on the

[17] Note that $dC_G/d\pi = Y - D_L$ is decreasing in D_L. In particular, when $\underline{\pi}(Y - D_L) - (D_0 - p_L D_L) \geq 0$ the government is fully insured since $C_G \geq 0$ for all realizations of π.

supply side and the debtor country is on the demand side. In particular, we consider the effect of investors' risk aversion (captured in the model by their wealth w) and the effect of the country's expected repayment capacity (captured in the model by Y). We focus on four limit cases.

Case I: Risk-neutral investors, high expected revenues

Assume that investors are risk neutral and government resources satisfy $\underline{\pi}Y - D_0 \geq 0$. Investors' risk neutrality implies that $p_L = \pi_0$. In addition, the condition on government resources implies that

$$\underline{\pi}(Y - D_L) - (D_0 - p_L D_L) = \underline{\pi}(Y - D_L) - (D_0 - \pi_0 D_L) \geq (\pi_0 - \underline{\pi})D_L \geq 0,$$

with the last inequality following from $\pi_0 \geq \underline{\pi}$. As a result, independently of the maturity structure, the risk premium on long-term bonds is zero and the government never needs to carry out a fiscal adjustment in period 1. This case shows that when both investors' wealth and the government's expected revenues are high, term premia are low and the maturity structure is undetermined. This result reflects the fact that when investors and the government are both risk neutral, it does not matter which one holds the risk.

Case II: Risk-averse investors, high expected revenues

Assume that investors are risk averse, while government resources still satisfy $\underline{\pi}Y - D_0 \geq 0$. This condition guarantees that if the government issued no long-term bonds and financed D_0 solely with short-term bonds ($D_S = D_0$), it would never face a rollover crisis. Since investors would hold no country risk, the risk premium on long-term bonds would be zero ($p_L = \pi_0$).[18] If the government issued a positive amount of long-term bonds, it would still avoid a rollover crisis in period 1 but it would face a higher borrowing cost. Its payoff would be

$$\pi_0 Y - D_0 - (\pi_0 - p_L)D_L < \pi_0 Y - D_0.$$

As a result, any $D_L > 0$ is suboptimal. This case shows that when investors' wealth is low and the government's expected resources are high, term premia are low and the maturity structure is

[18] In this case, p_L is the price of long-term bonds in the limit when $D_L \to 0$.

short. This result reflects the fact that when investors are more risk averse than the government, it is optimal for the government to hold the risk by issuing short-term bonds.

Case III: Risk-neutral investors, low expected revenues

Assume that investors are risk neutral, while government resources are such that $\underline{\pi}Y - D_0 < 0$. Investors' risk neutrality implies that $p_L = \pi_0$. Let $\hat{D}_L = \frac{D_0 - \underline{\pi}Y}{\pi_0 - \underline{\pi}}$. If the government issued an amount of long-term bonds $D_L \geq \hat{D}_L$, then

$$\underline{\pi}(Y - D_L) - (D_0 - p_L D_L) = \underline{\pi}(Y - D_L) - (D_0 - \pi_0 D_L) = \underline{\pi}Y - D_0 + (\pi_0 - \underline{\pi})D_L \geq 0.$$

In this case, the government would never face a rollover crisis.[19] Any amount of long-term bonds $D_L < \hat{D}_L$ would lead to a positive probability of rollover crisis and would thus be suboptimal. This case shows that when investors' wealth is high and the government's expected resources are low, term premia are low and the maturity structure is long. This result reflects the fact that when the government is more risk averse than investors, it is optimal for the government to transfer the risk to investors by issuing long-term bonds.

Case IV: Risk-averse investors, low expected revenues

Finally, assume that investors are risk averse, while government resources are such that $\underline{\pi}Y - D_0 < 0$. In this case, the government has to trade-off the cost of a rollover crisis associated with short-term borrowing against the high borrowing cost associated with long-term borrowing. This leads us to the following proposition.

Proposition 1. *When investors are risk averse and government resources satisfy $\underline{\pi}Y - D_0 < 0$, there is an optimal amount of long-term borrowing $D_L \in (0, \hat{D}_L)$, the risk premium on long-term bonds is positive ($p_L < \pi_0$), and the probability of a rollover crisis is positive.*

Proof: See Appendix A.

The proposition states that when investors are risk averse and expected government resources are low, the optimal maturity structure is an interior solution. By setting $D_L = 0$, the government

[19] Note that $\hat{D}_L \geq 0$ since the government's expected revenue satisfies $\pi_0 Y > D_0$ and $\underline{\pi} < \pi_0$. In the case in which $\underline{\pi} = 0$, $\hat{D}_L = \frac{D_0}{\pi_0}$ and the unique optimum is to issue no short-term debt ($D_S = 0$).

would not have to pay the risk premium associated with long-term borrowing, but it would face a high expected fiscal adjustment cost in period 1 (when a large stock of short-term debt is to be rolled over). By setting $D_L = \hat{D}_L$, the government would completely avoid a rollover crisis in period 1, but it would face a high borrowing cost in period 0. It is easy to see why the solution is interior. At low levels of D_L, investors are not very exposed to the country risk, so it is not very expensive to increase D_L. At high levels of D_L, the country is well insured, so the cost of lowering D_L in terms of a higher cost from a rollover crisis is low. In addition, since investors are risk averse and $D_L > 0$, the risk premium on long-term bonds must be positive.

Supply and demand side crises

These four cases are summarized in Figure 1, where they are represented in the (w, Y) space. This figure is useful to discuss the effects of supply and demand side shocks on debt maturity and the term premium.

A shift to the left reflects a reduction in investors' wealth (or an increase in investors' risk aversion), which represents a deterioration of the supply side. The increase in investors' risk aversion causes an increase in the term premium and a shift toward shorter maturities, as the government finds it optimal to transfer some of the risk from investors to itself. In the case of a shift from region I to region II, this shift does not result in a rollover crisis, since expected repayment capacity is high. In the case of a shift from region III to region IV, this shift does involve an increase in the cost of a rollover crisis, since expected repayment capacity is low. Still, it is optimal for the government to hold this risk because of the savings in borrowing cost associated with short-term debt. Intuitively, a negative supply shock leads to lower quantities (less long-term borrowing) and higher cost of borrowing (higher term premium).

A shift down reflects a reduction in the country's expected repayment capacity, which represents a deterioration of the demand side. The decrease in expected repayment capacity increases the cost of a rollover crisis. As a result, the government finds it optimal to transfer some of the increased risk to investors by shifting toward longer debt maturities, which results in a higher term premium. In the case of a shift from region I to region III, investors have low risk aversion and thus are willing to hold the additional risk without demanding a higher premium. In the case of a shift from region

II to region IV, the shift toward longer maturities does increase the term premium since investors are risk averse. Intuitively, a positive demand shock leads to higher quantities (more long-term borrowing) and higher cost of borrowing (higher term premium).

2.5 Implications of the model

In the remaining of the paper, we empirically study the behavior of the term premium and bond issuance by emerging market sovereigns at different maturities. Due to the stylized nature of the model, we test the main implications that seem likely to hold in any model where investor side factors play an important role. In particular, we focus on whether there exists a positive term premium, whether the term premium increases during crises, and whether the maturity of bond issuance shifts during crises.

The model predicts that the term premium should be positive on average. It also predicts that, during crises, the term premium should increase. This occurs either because of an increase in investors' exposure to country risk in the case of a demand side shock, or because investors require a higher premium to hold the same amount of risk in the case of a supply side shock. The predictions on the optimal maturity structure depend on the type of shock. While a demand side shock causes the country to issue long-term bonds to shift risk toward investors, a supply side shock causes the country to issue short-term bonds to shift risk away from investors and save on borrowing costs. As a result, even though we cannot identify supply and demand side shocks, the correlation between the term premium and the maturity of bond issuance allows us to establish whether the predominant shocks are on the supply side (shifting the supply curve) or on the demand side (shifting the demand curve).[20]

[20] In a more general setting, we would expect a demand side shock to affect the wealth of investors through its effect on the price of bonds investors already hold. In this case, a demand shock would have the direct effect highlighted in the model, but also an indirect effect on the supply side. As we show in the empirical section, crises are typically associated with higher term premia and a shift towards shorter maturities. This comovement suggests that either the predominant shocks are on the supply side or that, if they are on the demand side, their direct effects are dominated by their indirect effect on the supply side. In either case, the results support the conclusion that supply side factors play an important role in emerging market crises.

3 Data

We now turn to the empirical evidence and analyze both price and quantity data. The price data are used to estimate risk premia on short and long-term bonds, and to characterize the behavior of the implied term premium. The quantity data are used to analyze the comovement between the maturity structure of bond issuance and the observed term premium.

We conduct the empirical analysis by collecting data on sovereign bonds from the early 1990s up to 2003 for eight emerging economies. These countries are Argentina, Brazil, Colombia, Mexico, Russia, Turkey, Uruguay, and Venezuela. To calculate the term premium, we also collect data on sovereign bonds for Germany and the U.S., which are assumed to be free of default risk. The choice of emerging markets is constrained by data limitations. To estimate time series of the term premium, we need enough foreign currency denominated bonds of different maturities at each point in time. Therefore, our sample corresponds to those emerging economies that borrowed heavily in foreign currency, generating a rich enough pool of bonds. Furthermore, we restrict the sample to sovereign bonds because they constitute the most liquid debt instrument in most emerging markets, and because private debtors in emerging markets do not issue enough bonds to compute the term premium.

We collect weekly (end-of-week) time series of bond prices, using all available bonds for each country.[21] We also collect other information on these bonds, including currency denomination, coupon structure, and maturity. In addition, we compile time series of bond issuance in foreign currency. For each bond, we collect the amount issued, currency denomination, and maturity date. With this information, we construct weekly time series of amount issued valued in U.S. dollars. We exclude from the sample the bonds with collateral and special guarantees, such as collateralized Brady bonds and those issued by Argentina during the large pre-default swap. We also exclude bonds issued during forced restructurings, like those issued by Argentina and Russia post default and Uruguay post crisis.[22] We collect data from three different sources: Bloomberg, Datastream, and J.P. Morgan.

Regarding the currency choice, we restrict the sample to bonds denominated in foreign currency because it is not possible to construct the term premium by mixing bonds with different risk

[21] We eliminate the observations where bond prices do not change over time, as this typically reflects no trading.
[22] See Duffie, Pedersen, and Singleton (2003) for more details on the Russian default.

characteristics. (Consider that both default risk and currency risk would affect the term premium on domestic currency bonds.) This reduces the sample significantly, given that many countries, especially Asian and Eastern European ones, mostly issue domestic currency bonds. With respect to the currency selection, we use bonds denominated in U.S. dollars, Deutsche marks, and euros for the estimation of bond spreads. This choice is not very restrictive as most foreign currency bonds are issued in these currencies. As benchmarks of risk-less bonds, we use those issued by Germany in both Deutsche marks and euros and by the U.S. in dollars. We use bonds in all foreign currencies for our estimations of bond issuance.

Table 1 lists the countries in the sample, along with the time periods used for the price and quantity data. The price data start in April 1993 (with a different starting date for each country), ending in May 2003 for all countries. The quantity data cover a longer time span, starting in January 1990 and ending in December 2002. Table 1 also displays the number of bonds available to calculate bond prices and the number of bonds issued during the sample period. For the price data, the table shows the average minimum maturity, maximum maturity, and 75th percentile. Though most bonds have a maturity of less than 15 years, the countries in the sample have been able to issue longer-term bonds with maturity of 20 and 30 years. The bottom panel of Table 1 displays the average amount issued by maturity, showing that issuance is distributed across maturities. Appendix Table 1 lists all the bonds used in the paper, specifying for each bond its characteristics and whether it is used for the price and/or quantity analysis. The number of emerging market bonds used in the paper is 466, while the total number of bonds (including German and U.S. bonds) is 746.

4 Term premium

In this section, we show that, consistent with the model predictions, observed term premia on emerging market bonds are positive and increase during crisis times. In the model, the risk premium on short-term debt is set to zero for simplicity, so the risk premium on long-term bonds and the term premium are identical. In reality, the risk premium on short-term bonds is also positive. Thus, to obtain information on the term premium, we first need to estimate the risk premia on bonds of different maturities.

The risk premium for each maturity is estimated by using ex-post excess returns on emerging market bonds over comparable default-free (German and U.S.) bonds. To calculate the risk premium, we need to obtain first bond yields, spreads, and prices. We begin by estimating time series of German and U.S. yields curves and emerging market spread curves. The maturity-τ spread, $s_{t,\tau}$, is defined as the difference between the yield, $y_{t,\tau}$, on an emerging market zero-coupon bond of maturity τ and the yield, $y^*_{t,\tau}$, on a default-free zero-coupon bond of maturity τ, $s_{t,\tau} = y_{t,\tau} - y^*_{t,\tau}$. We use this information to obtain bond returns at different maturities and over time for every country. This enables us to make cross-country, cross-maturity, and over-time comparisons. Note that it would be impossible to carry out the analysis using the raw data because each country has a different set of bonds at each point in time, with varying maturity and coupon structure. Appendix B describes the methodology used to estimate yields and spread curves.

Figure 2 displays the estimated spreads over time for each country. The figure shows spreads at two maturities to illustrate how short-term (3-year) and long-term (12-year) spreads move over time.[23] The figure shows some interesting facts. First, spread curves are, on average, upward sloping. Second, spreads increase during periods of financial crises. For example, during the crises in Argentina, Russia, and Uruguay, spreads jump to more than 25 percent or 2,500 basis points. Third, short-term spreads are more volatile than long-term spreads. In fact, during periods of very high spreads there is an inversion of the spread curve, with short-term spreads becoming higher than long-term ones.

Using the estimated spread curves and U.S. yield curves, we compute the price $P_{t,\tau}$ of a representative emerging market bond of given maturity τ and coupon c. In Figure 3, we plot the price of short and long-term bonds, with a semi-annual coupon of 7.5 percent.[24] To simplify the comparisons, the value at the beginning of the sample is normalized to 100 for each country. The figure shows that the prices of long-term emerging market bonds are more volatile than those of short-term bonds. In particular, at the onset of crises the prices of long-term bonds fall much more than those of short-term bonds, while during the recovery, the prices of long-term bonds increase much more than those of short-term bonds. Next, we show how these price changes are reflected

[23] Our methodology allows us to compute spreads at every maturity and, therefore, construct the entire spread curve over time.

[24] For prices and returns, we choose to use coupon-paying bonds because emerging markets almost never issue zero-coupon bonds. So the pricing errors for coupon-paying bonds are smaller than for zero-coupon bonds.

in the risk premium and the term premium.

After having obtained prices, we estimate the risk premium using excess returns or, more precisely, average ex-post excess returns over T periods.[25] The return of holding an emerging market bond, $r_{t+1,t}$, for one period (one week) is equal to $\frac{P_{t+1,\tau-1}-P_{t,\tau}}{P_{t,\tau}}$, in the case of no coupon payment at date $t+1$. We compare this return to the return on a German or U.S. bond, $r^*_{t+1,t}$. Excess returns, er_τ, are then expressed as the returns of holding emerging market bonds of maturity τ and coupon c over the returns of "comparable" risk-less bonds,

$$er_\tau = \frac{1}{T-1}\sum_{t=1}^{T-1} er_{t+1,\tau} = \frac{1}{T-1}\sum_{t=1}^{T-1}\left(r_{t+1,t} - r^*_{t+1,t}\right).$$

Positive excess returns mean that emerging market bonds pay positive returns on top of what German or U.S. bonds do. Note that the computation of excess returns does not simply use risk-less bonds of the same maturity and coupon structure. In fact, we obtain excess returns by taking into account the payment profile of the emerging market bond, and comparing it to a portfolio of risk-less bonds that replicates its payment structure.[26]

The term premium, tp_{τ_2,τ_1}, is given by the difference between the risk premium (average excess returns) on long-term bonds (of maturity τ_2) and that on short-term bonds (of maturity τ_1),

$$tp_{\tau_2,\tau_1} = er_{\tau_2} - er_{\tau_1}.$$

Before going to the empirical estimates, two points are worth noting about the term premium. First, a positive slope in the spread curve does not imply that the term premium is positive, since the term premium also depends on the evolution of spreads over time and on how defaults affect bonds of different maturities. Second, the difference in risk premium between long and short-term emerging market bonds would typically reflect both the price risk associated with the probability of default and the term premium inherent in default-free bonds. Here we concentrate on the first component, because we define the term premium on emerging market bonds in excess to the term premium on default-free bonds.[27]

[25] To calculate the means, we use holding periods of one week. We also experimented with holding periods of one month, obtaining similar results.

[26] See Appendix B for more details.

[27] Since the term premium for U.S. and German bonds is positive, the total term premium would be larger if we

4.1 Unconditional term premium

Table 2 shows average annualized excess returns across all observations in the sample. The table displays values for bonds with maturities of 3, 6, 9, and 12 years and annual coupon payments of 5, 7.5, and 10 percent (paid semi-annually). These "theoretical" bonds are representative of emerging market sovereign bonds both in terms of maturity and coupons. Table 2 shows that, when considering all the countries in the sample, excess returns are positive for all coupon sizes and maturities. More relevant for our analysis, excess returns increase with maturity in all cases, so the term premium is also positive.[28] Not surprisingly, there is heterogeneity in the results at the country level, reflecting the different performance of each emerging market. However, the results are not driven by any particular emerging market, since they survive when we exclude from the sample individual countries.

What do the results in Table 2 tell about how much emerging market bonds pay relative to comparable default-free bonds? To answer this question, consider the results for bonds with annual coupons of 7.5 percent (the one closest to actual coupons). The results in Table 2 say that, on average, investors receive an annualized return 3 percent higher when investing in a 3-year emerging market bond than when investing in a German or U.S. 3-year bond, and an annualized return 7 percent higher when investing in a 12-year emerging market bond than when investing in a German or U.S. 12-year bond. In other words, emerging market bonds pay a positive risk premium and a positive term premium.

4.2 Term premium during crisis and tranquil times

We now study whether the term premium is different during crisis and tranquil times. To do so, we first need to define crises. The literature has used different definitions, with no definition being perfect as certain ad-hoc criteria need to be adopted. To partly overcome this problem, we use four different definitions of crises to gauge the robustness of our results. Since we are interested in studying conditional returns, we adopt definitions that use only ex-ante information. In other words, to determine whether there was a crisis at time t, we only use information that was available

added the two components.

[28] Also note that excess returns decrease with coupon size. This is expected given that the term premia are positive and duration is a decreasing function of coupon size.

at time t. Crisis definition 1 is our benchmark definition; it sets the beginning of a crisis when 9-year spreads are greater than a threshold, which is defined as the average spread over the previous six months plus 300 basis points.[29] The end of the crisis is at the end of the first four-week period in which spreads have remained below the threshold used to determine the beginning of the crisis. Crisis definition 2 is similar to crisis definition 1, but uses 400 basis points to define the threshold. Crisis definitions 3 and 4 are similar, but use a one-week period instead of a four-week period to end the crisis.

Table 3 lists the crisis periods obtained with crisis definition 1. All major crises are captured by the crisis definition. For example, the Mexican 94-95 crisis affected Argentina and Brazil. (Note that our sample does not contain spreads for Mexico during that period.) The Russian crisis affected all countries in the sample except Uruguay, which had its own crisis after Argentina defaulted on its debt in early 2002. The Argentine crisis started when the government was forced to change its economic plan and the default became very likely. Brazil and Colombia were also hit by crises in 2002.

Then, we calculate excess returns at different maturities, splitting the sample between tranquil times and crises. The results are reported in Table 4 for all crisis definitions. We report results using bonds with coupons of size 7.5 percent, although the results are similar for bonds with coupons of 5 and 10 percent. The results indicate that both excess returns and the term premium are very large during crises, and close to zero during tranquil times. For example, according to definition 1, the difference between the average 12- and 3-year annualized excess returns (our measure of the term premium) is around 28 percent. Table 5 displays excess returns by country according to crisis definition 1. The table shows that for most countries the risk premium and the term premium are large during crises and low during non-crisis periods. There are two exceptions, excess returns are negative during crises in Uruguay and, for short maturities, in Argentina. This is due to the fact that both countries have experienced actual defaults, namely, crises in which the situation continued to deteriorate rather than improve. In the case of Argentina, this is partly compensated by the Mexican crisis, when excess returns were very high.

In Table 6, we analyze more formally whether excess returns across maturities are predictable,

[29] To classify the first observations of the sample for each country, we repeat the first price observed during the previous six months.

namely whether they change during crisis times. The table presents least squares regressions with the long-short excess return as the dependent variable, defined as the difference for each observation between a long-term (9-year or 12-year) excess return and a short-term (3-year) or medium-term (6-year) excess return. The independent variable is a dummy that takes the value one during crises and zero otherwise. To make sure that the results are robust to our crisis definition, we also try log spreads, defined as $\log(1+s_{t,\tau})$, at different maturities as the independent variable. The estimations pool all observations available across countries and over time. Results with and without country and time effects are reported. The regressions use robust estimates of the standard errors. To do so, we define clusters by the country and crisis indicators, thus, observations are assumed to be independent across clusters, but not necessarily independent within clusters. This allows for a general form of heteroskedasticity across observations and non-zero correlation within clusters.[30]

The results in Table 6 show that the crisis variable is positive and statistically significant at the 1 percent level for all regressions. Since the coefficient on the crisis dummy is an estimate of the term premium, the results imply that the term premium is positive. The estimations also show that the magnitude of the coefficient is very large. For example, the regression for the 12-3 term premium with no country or time dummies shows that the term premium increases by 0.449 percent per week during crisis times, which on an annualized basis corresponds to more than 26 percent. The coefficient of 0.045 on the 6-year spread in the regression of the 12-3 term premium states that when 6-year spreads increase by 1 percent, the annualized long-short excess return increases by 2.4 percent. Confirming the evidence presented in the previous tables, these regressions imply that the term premium is time-varying, increasing during periods of crises and high spreads.[31]

We have already shown that the term premium increases during crises. To estimate to what degree this increase can be ascribed to an increase in the volatility of returns during crises, we plot in Figure 4 the excess returns against the standard deviation of excess returns for crisis, non-crisis, and all periods. The figure shows that during non-crisis periods excess returns are close to zero, with the standard deviation increasing with maturity. During crisis periods, both excess returns

[30] As further robustness tests, we also estimated regressions with crisis dummies constructed with crisis definitions 2, 3, and 4. Moreover, we redefined clusters using either country or crisis indicators. In all cases, we obtained similar results.

[31] The fact that investors demand higher risk premia and term premia during crises implies that, at the onset of crises, bond prices need to fall enough such that they become sufficiently attractive to investors. In this sense, bond prices, especially those of long-term bonds, "overreact" during crises.

and their standard deviations increase for all maturities. It is important to note that the increase in excess returns cannot be accounted for by the increase in volatility. The reason is that the Sharpe ratio (i.e. the ratio of excess returns over their standard deviation) increases substantially during crisis times. The average Sharpe ratio across maturities is 0.006 during non-crisis periods and larger than 0.06 during crisis periods. Interestingly, the Sharpe ratio is higher for long-term bonds than for short-term bonds during crises.

In sum, the results above are consistent with the model presented in Section 2, which shows that crises can be due to shocks to the country's repayment capacity or to shocks to investors' wealth (or other determinants of risk appetite). In both cases, the model predicts that the term premium should increase. In the case of debtor side shocks, or demand shocks, the country demands more long-term funds, driving up the cost of long-term borrowing. In the case of investor side shocks, or supply shocks, bondholders become more sensitive to the price risk of long-term bonds and demand a higher term premium. To complement the price evidence presented so far, the next section studies bond issuance at different maturities, during crisis and tranquil times. This will allow us to shed light on the relative role of debtor and investor side shocks during crises. But before doing so, we discuss three points related to the results presented in this section.

4.3 Interpreting the evidence

We end this section with a discussion of three issues that might help clarify the results related to the risk premium and the term premium. First, can our results be due to a peso problem? Second, what is the relation between our results and the literature on the term structure of interest rates in developed countries? Third, does the fact that the risk premium is close to zero during tranquil times imply that our explanation of why countries borrow short term is crisis contingent?

4.3.1 Peso problem

It is important to point out that it is very unlikely that our results on the risk premium and, even more, on the term premium are the consequence of defaults being underrepresented in our sample, a phenomenon also known as the peso problem.[32] First of all, our sample does include a number

[32] To be precise, the name comes from the study of devaluations (of the Mexican peso) rather than defaults, but the same argument applies.

of default episodes and it is difficult to claim that the period 1993-2003 was particularly good for emerging markets. Second, as explained below, the behavior of short and long-term bonds during defaults suggests that the results are not driven by a peso problem.

Consider first the results on the term premium. Usually, long-term bonds trade at higher discounts (i.e. lower percentage of face value) than short-term bonds, especially in periods of high spreads (when defaults are likely to take place). In addition, post-default workouts generally involve payments approximately proportional to face value. As a result, episodes of default should lead to larger losses on short-term bonds than on long-term bonds.[33] This suggests that if defaults were underrepresented in our sample, the term premium would be even higher than the one we report, especially during crisis times.

The argument above, that a peso problem is unlikely to drive the results on the term premium, leads one to believe that a peso problem is not driving the positive risk premium either. The argument goes as follows. It is very difficult to think of an environment where long-term bonds have higher returns than short-term bonds, while at the same time either long or short-term bonds have a negative (or zero) risk premium. The reason is that the returns on short and long-term bonds are highly correlated. A negative (zero) risk premium would imply a positive (zero) correlation between bond returns and investors' stochastic discount factor or marginal utility and, as a result, a negative (zero) price of emerging market risk. But since the returns on long-term bonds are much more volatile than those of short-term bonds, a negative (zero) price of risk would imply a negative (zero) term premium, contradicting our findings. Therefore, it is not likely that the term premium is positive, as we find, without the risk premium being positive as well. In other words, the existence of a positive term premium suggests that the price of emerging market risk is positive and, therefore, the risk premium is also positive.[34]

[33] This in fact was the case during the Argentine default. We studied the excess returns of buying Argentine bonds of different maturities before the default (which was declared on December 23, 2001) and holding them until after the default. For purchase dates between early November 2001 and one week before the default and selling dates between one week and one year after the default, the losses on short-term bonds were virtually always greater than those on long-term bonds, by around 10 percent.

[34] The idea that the observed term premia carry information on the underlying risk premium seems to be very useful since estimates of the risk premium are typically very sensitive to the sample under study. For example, Eichengreen and Portes (1988) find that the ex-post excess returns on sovereign bonds issued by foreign countries in the United States and Britain during the interwar years were close to zero. Klingen, Weder, and Zettelmeyer (2003) find that the ex-post excess returns on emerging market sovereign lending were negative during the 1970s and 1980s, but positive during the 1990s. In this paper, although excess returns are positive in the full sample, we find negative excess returns for Argentina and Uruguay.

4.3.2 Related literature on the term structure of interest rates

There is a vast literature on the term structure of interest rates in developed countries related to our findings on the risk premium and the term premium. Our results can be interpreted as deviations from the "pure expectations hypothesis" and the "expectations hypothesis," but stated in terms of spreads instead of yields.

Assume first that investors are risk neutral with respect to default episodes in emerging markets. In this case, spreads should only reflect the expected losses from default (both the risk premium and the term premium should be zero) and the pure expectation hypothesis in terms of spreads should hold. A second, less restrictive, assumption would be that spreads reflect a risk premium that may be different across maturities but is constant over time. In this case, changes in spreads should only reflect innovations to the expected default losses, namely, the expectation hypothesis in terms of spreads should hold.[35]

In the literature on emerging market borrowing, the idea that spreads mostly reflect the market assessment of the probability of default of a given country is still widely held. However, our findings that the risk premium and the term premium are on average positive and that both increase during crises suggest that neither the pure expectation hypothesis nor the expectation hypothesis hold for emerging market spreads. The finance literature on the term structure in developed economies has gradually rejected both versions of the expectation hypothesis and has moved toward attempts at modelling and explaining patterns of time-varying risk premia.[36] Our model provides a different simple equilibrium framework that is consistent with the observed patterns of the risk premium and the term premium in emerging market bonds.[37]

4.3.3 When is it cheaper to borrow short term?

Our results show that it is cheaper to borrow short-term during both crisis and tranquil times. The fact that it is cheaper to borrow short term during crises is clear from the high term premia during

[35] For some references on the topic and a definition of the pure expectation hypothesis and the expectation hypothesis, see Cox, Ingersoll, and Ross (1985), Campbell, Lo, and MacKinlay (1997), Bekaert and Hodrick (2001), and Dai and Singleton (2002).

[36] See references in Cochrane (1999).

[37] Clearly, to provide a quantitative assessment of these facts more work remains to be done, both in the direction of no-arbitrage models and in the direction of equilibrium models. For no-arbitrage models see Duffie and Singleton (1999) and Duffie, Pedersen, and Singleton (2003).

those episodes. In addition, it is also cheaper to borrow short-term during tranquil times because there is a positive transition hazard rate from tranquil to crisis times. As a result, when a country issues long-term bonds during tranquil times, it has to compensate bondholders for the drop in bond prices that would take place if a crisis were to materialize. In other words, the spreads on long-term bonds issued during tranquil times reflect not only the expected losses from default, but also the expected risk premia that would need to be paid during the lifetime of the bond. This is true irrespective of whether a crisis actually materializes. All that is needed is a positive transition probability.

A caveat to this reasoning applies. This argument is valid only if emerging economies cannot repurchase outstanding long-term bonds at the beginning of crises by issuing short-term bonds. In other words, we are assuming that by issuing long-term bonds during tranquil times, countries are forcing themselves to go through crises carrying these long-term obligations. The assumption that there is some cost associated with repurchasing long-term bonds during crises is supported by the fact that countries do not repurchase existing long-term bonds during those times, while they very seldom issue new long-term bonds during periods of financial turbulence (as shown in the next section). It is difficult to explain this knife-edge result of zero net new long-term issues in the absence of some cost (signalling or otherwise) associated with retiring existing long-term bonds.[38]

5 Bond issuance

The model in Section 2 shows that the comovement between the term premium and the maturity structure of debt can shed light on the type of shocks characterizing the cyclical behavior of emerging market debt. On the one hand, demand side shocks such as an increase in current financing needs or a reduction in future expected government revenues are likely to lead to an increase in the maturity structure of debt and a resulting increase in the term premium, generating a positive comovement. On the other hand, supply side shocks, such as a decrease in investors' wealth, are likely to lead

[38] The IMF (1999) reports that in fact there have been some attempts to buyback debt perceived to be "mispriced," i.e. paying a high risk premium. An example is the buyback of Polish Brady bonds in 1998, which amounted to some 750 million dollars, after a buyback of around 1.7 billion dollars in 1997. Given that these operations, if known, would drive bond prices up, they are usually carefully conducted and not officially confirmed until after they have been completed. If successful, a quiet buyback at the discounted price delivers a net reduction in the debt burden. Though these operations exist, the difficulty in completing them successfully makes them rare and small relative to the outstanding debt. Moreover, these operations take place in favorable times.

to an increase in the term premium and a resulting decrease in the maturity structure of debt, generating a negative comovement.

In this section, we study whether the behavior of the quantity data are consistent with demand or supply type of shocks. We concentrate on two sets of variables, the amount issued at different maturities and the average bond maturity. We study the time-varying patterns of these variables. In particular, we analyze how their behavior is affected by crises, by different measures of spreads, and by the term premium.

To study the amount issued at different maturities, we run a separate regression of issuance at each maturity as a function of each conditioning variable. We use a Tobit model, estimated by maximum likelihood, pooling all observations. These estimations take into account the fact that observations are left censored at zero. The dependent variable is the amount issued at each maturity in any given week, normalized by the average weekly issues for each country. This normalization takes into consideration that the average amount issued varies across countries. We use four different bond maturities: up to 3-year maturity (short term), more than 3-year maturity and up to 6-year maturity (medium-short term), more than 6-year maturity and up to 9-year maturity (medium-long term), and more than 9-year maturity (long term). As explanatory variables we use, alternatively, the crisis dummy defined above, the 3-year spread, the 9-year spread, the emerging market bond index (EMBI) spread for each country, and the predicted term premium for each country. For spreads, we use log-spreads, defined as $\log(1+s_{t,\tau})$. The EMBI spreads, calculated by J.P. Morgan, are well-known measures of long-term spreads in emerging markets. They not only provide an alternative estimate of long-term spreads, but also extend the sample for Mexico to cover the Mexican crisis (though they exclude Uruguay). We use the predicted term premium because it most directly captures the cost of issuing long-term debt relative to short-term debt. This variable is computed by regressing ex-post excess returns on 3-year and 9-year spreads and then obtaining the predicted value. As before, we compute robust standard errors using the country and crisis indicators as clusters.

The Tobit estimations are reported in Table 7. The estimations show that short-term issues are hardly affected by any of the conditioning variables; only the 3-year spread is statistically significant at the 10 percent level. However, medium- and long-term issues do show clear cyclical patterns. The conditioning variables become more statistically significant and the point estimates negative and large in magnitude. In the regressions for long-term issues, all the regressors are significant, at least at the 5 percent level. The coefficients reported, which are the marginal effects or the effects on the observed (not the latent) variable, also seem large. For example, an increase of 100 basis points in 9-year spreads leads to a decline in the weekly issues of 0.223, where the average value of the normalized weekly issue is 1. In sum, the estimations in Table 7 suggest that during crises and, more generally, in periods of high spreads, countries tend to issue less debt. In addition, the longer the maturity of debt, the larger the effect of crises and spreads on the amount issued. Interestingly, the estimated term premium has a big negative effect on long-term issues, but no statistically significant effect on shorter-term issues. The result that short-term issues are barely affected by the different variables reflects the fact that although countries tend to issue less when spreads are high, they mostly issue short-term bonds (if they issue at all). These two effects cancel out, leading to non-significant coefficients.[39]

To study the average maturity of issues, we estimate a model that takes into account the incidental truncation of the data, since the average maturity is only available when countries issue bonds and, otherwise, there are missing observations. As noted initially by Heckman (1979), ignoring the missing values might lead to a sample selection bias. In our case, one would tend to miss observations when spreads are high and countries do not issue any bonds. To account for this selection, we estimate two equations simultaneously by maximum likelihood. One equation describes the probability of observing the average maturity of issues each week. The second equation estimates how the average maturity is correlated with the conditioning variables. In this type of estimations, it is usually difficult to select the variables that enter in each equation. We choose different specifications to see whether the results are robust to this choice.[40] The regressors included in the selection equation are similar to those used for the Tobit models. These variables help to predict whether countries issue at all. The regressors included are, alternatively, the crisis dummy, the short and long-term spreads, and the country EMBI spread. For the main equation, we use the long-term spread and, alternatively, the estimated term premium, which captures the relative

[39] Note that the negative sign of the coefficients is not likely the result of reverse causality. If bond issuance had an impact on spreads, an increase in the demand for funds would push down prices and increase spreads, resulting in a positive coefficient. To the extent that reverse causality played a role, it would bias the results against our findings.

[40] As another robustness check, we also estimated the main equation without taking into account the selection bias and obtained similar results.

cost of issuing long term. As the variables are not scaled, we include country dummies. Again, we compute robust standard errors using the country and crisis indicators as clusters.

The results of the selection equations, displayed in Table 8, show that countries are less likely to issue bonds during crisis times and, more generally, when spreads are high. In addition, the results of the main equations show that the average maturity of issues shortens when long-term spreads or the predicted term premium increases. These results are consistent with the pattern displayed in Figure 5, which shows the average maturity and spreads over time for each country. The figure also shows that issuance is negatively correlated with crises and, more generally, with the level of spreads. Finally, another way to summarize the evidence is that countries try to extend the maturity structure of their debt whenever market conditions permit it, i.e. when markets require a low term premium.

The results presented in this section, when combined with the results in Section 4, provide compelling evidence that supply side factors play an important role during emerging market crises. The results show that crises and, more generally, periods of high spreads, are associated with higher risk and term premia and lower amount and shorter maturity of issues. If crises were mostly the result of debtor side factors (demand shocks), they would be associated with more issues at longer maturities and a higher term premium. The fact that the term premium increases while debtors are curtailing long-term borrowing suggests that investor side factors (supply shocks) play an important role during crises.

6 Final remarks

This paper proposes a new explanation to why emerging economies borrow short term, even though this type of debt increases their exposure to liquidity crises. We argue that countries choose to be exposed to crises because investors require a high term premium for holding long-term debt, making short-term borrowing cheaper. The model in the paper shows this trade-off and endogenously derives the maturity structure and the term premium (the relative cost of borrowing long term). The model illustrates the risk-sharing problem between the debtor country and investors. The empirical section of the paper shows that the term premium is, on average, positive and increases significantly during crises. Therefore, our findings explain not only why countries tend to borrow short term, but also why they rely so heavily on short-term debt during periods of financial turbulence. Finally, the negative correlation between the term premium and the debt maturity strongly suggests an important role of investor side factors in shaping the way that emerging economies borrow.

The distinction between investor and debtor side factors has important implications not only for academic discussions, but also for policy recommendations. One important example is the discussion on how to deal with financial crises. Some papers argue that countries borrow short term as a way to commit to the right policies when moral hazard is a problem. From this perspective, the cost of crises is what makes these episodes a strong disciplining device. Efforts to limit the cost of crises through loans from the international financial community, or other liquidity-providing mechanisms, would exacerbate the moral hazard problem, and could end up reducing welfare.[41] If, on the other hand, countries borrow short term because long-term debt is too expensive, those same crisis prevention mechanisms would improve welfare. The benefits would come not only from fewer and less severe crises, but also from cheaper long-term borrowing as a result of the reduction in the price risk of long-term debt.

The results in this paper lead to several possible directions for future research. First, it would be interesting to extend the coverage of our analysis to contrast the results presented here with results derived from bonds issued by other emerging economies, developed economies, domestic currency debt, and private borrowers. However, data restrictions to construct time series of spread curves will probably limit any future analysis to certain borrowers (likely other developed economies and primarily sovereign debtors). This type of analysis might shed light on whether investors treat the debt from developed countries differently than that from emerging economies. As another extension, the empirical analysis could be carried out in a dynamic framework to study the stochastic properties of spreads at different maturities. Preliminary evidence suggests that long-term spreads "overreact" to movements in short-term spreads. More precisely, long-term spreads seem to react to innovations in short-term spreads as if these innovations were more persistent than what they actually are, leading to excess volatility. It is interesting to note that this type of evidence seems at odds with what other authors have found when studying the dynamic behavior of yield curves in developed countries.[42] Finally, the fact that the Sharpe ratio of long-term bonds is higher than

[41] See Jeanne (2000) for a discussion of this argument.
[42] See Campbell and Shiller (1991).

that of short-term bonds suggests that the risk of long-term bonds is less diversifiable than the risk of short-term bonds. A possible explanation may lie on a higher sensitivity of long-term bonds to global factors (such as investors' risk appetite) and a higher sensitivity of short-term bonds to domestic factors (such as default probabilities). This hypothesis could be tested by estimating cross-country correlations at different maturities. A higher correlation at long maturities would not only explain the higher Sharpe ratios on long-term bonds, but also suggest a role for financial linkages as a source of contagion or, more generally, cross-country comovement.

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Appendix A: Model details

This appendix provides some details on the model.

Proof of Lemma 1.

The investors' first order condition is

$$E[u'(w + (\pi - p_L)D_L)(\pi - p_L)] = 0.$$

When $D_L = 0$, $u'(w+(\pi-p_L)D_L)$ is a positive constant, and it easily follows that $p_L = E[\pi] = \pi_0$. Next, we consider the case $D_L > 0$.

Let $F(\cdot)$ be the CDF of π. We can rewrite the first order condition as

$$\int_0^{p_L} u'(w + (\pi - p_L)D_L)(\pi - p_L)dF(\pi) + \int_{p_L}^1 u'(w + (\pi - p_L)D_L)(\pi - p_L)dF(\pi) = 0.$$

In the first region, $\pi - p_L < 0$ and $u'(w + (\pi - p_L)D_L) > u'(w)$. In the second region, $\pi - p_L > 0$ and $u'(w + (\pi - p_L)D_L) < u'(w)$. We thus have

$$u'(w)\int_0^{p_L} (\pi - p_L)dF(\pi) = \int_0^{p_L} u'(w)(\pi - p_L)dF(\pi) + \int_{p_L}^1 u'(w)(\pi - p_L)dF(\pi) > 0,$$

which implies $p_L < E[\pi] = \pi_0$.

We now show that $p'(D_L) < 0$. Differentiating investors' first order condition with respect to D_L and rearranging we obtain

$$\begin{aligned} p'(D_L)\left\{E\left[u'(w + (\pi - p_L)D_L)\right] + E\left[u''(w + (\pi - p_L)D_L)(\pi - p_L)\right]D_L\right\} &= \\ = E\left[u''(w + (\pi - p_L)D_L)(\pi - p_L)^2\right] \end{aligned}$$

Since $u'(\cdot) > 0$ and $u''(\cdot) < 0$, it easily follows that

$$E\left[u'(w + (\pi - p_L)D_L)\right] > 0$$

and

$$E\left[u''(w+(\pi-p_L)D_L)(\pi-p_L)^2\right]<0.$$

As a result, to show that $p'(D_L)<0$ it suffices to show that

$$-E\left[u''(w+(\pi-p_L)D_L)(\pi-p_L)\right]<0.$$

We can write

$$\begin{aligned}
-E\left[u''(w+(\pi-p_L)D_L)(\pi-p_L)\right] &= \\
= \quad & \int_0^{p_L} -\frac{u''(w+(\pi-p_L)D_L)}{u'(w+(\pi-p_L)D_L)}u'(w+(\pi-p_L)D_L)(\pi-p_L)dF(\pi)+ \\
& + \int_{p_L}^1 -\frac{u''(w+(\pi-p_L)D_L)}{u'(w+(\pi-p_L)D_L)}u'(w+(\pi-p_L)D_L)(\pi-p_L)dF(\pi).
\end{aligned}$$

Since $u(\cdot)$ displays decreasing absolute risk aversion, in the first region $\pi-p_L<0$ and

$$-\frac{u''(w+(\pi-p_L)D_L)}{u'(w+(\pi-p_L)D_L)}>-\frac{u''(w)}{u'(w)},$$

while in the second region $\pi-p_L>0$ and

$$-\frac{u''(w+(\pi-p_L)D_L)}{u'(w+(\pi-p_L)D_L)}<-\frac{u''(w)}{u'(w)}.$$

Thus,

$$-E\left[u''(w+(\pi-p_L)D_L)(\pi-p_L)\right]<-\frac{u''(w)}{u'(w)}E\left[u'(w+(\pi-p_L)D_L)(\pi-p_L)\right]=0,$$

where the last equality follows from the first order condition.

Proof of Proposition 1.

Let $F(\cdot)$ be the CDF of π, and let

$$x(\pi,D_L)=\max\left\{D_0-\pi Y+(\pi-p_L)D_L,0\right\}$$

be the fiscal adjustment in period 1. The government's objective function can be written as

$$W(D_L) = \pi_0 Y - D_0 - (\pi_0 - p_L)D_L + \int_{x(\pi, D_L) \geq 0} [x(\pi, D_L) - C(x(\pi, D_L))]\, dF(\pi).$$

Differentiating W with respect to D_L, we obtain

$$W'(D_L) = -\frac{d}{dD_L}(\pi_0 - p_L)D_L + \int_{x(\pi, D_L) \geq 0} \left[\left(1 - C'(x(\pi, D_L))\right) \frac{d}{dD_L}(\pi - p_L)D_L \right] dF(\pi).$$

When $D_L = 0$, the first term in $W'(D_L)$ is zero and we have

$$W'(0) = \int_{\underline{\pi}}^{\hat{\pi}} \left(1 - C'(x(\pi, 0))\right)(\pi - \pi_0) dF(\pi),$$

where we used the fact that $p(0) = \pi_0$, and $\hat{\pi} = \frac{D_0}{Y}$ is the minimum π such that $x(\pi, 0) = 0$. The fact that $C'(x) > 1$ for $x > 0$ implies that the first factor in the integrand is negative. The fact that $\pi_0 Y - D_0 > 0$ and $\underline{\pi} Y - D_0 < 0$ implies that $\hat{\pi} \in (\underline{\pi}, \pi_0)$ and, thus, the second factor in the integrand is also negative. This shows that

$$W'(0) > 0.$$

When $D_L = \hat{D}_L$, the second term in $W'(D_L)$ is zero and we have

$$W'(\hat{D}_L) = -(\pi_0 - p_L) + p'(\hat{D}_L)\hat{D}_L.$$

The fact that investors are risk averse implies that $p_L < \pi_0$ and $p'(\hat{D}_L) < 0$. This shows that

$$W'(\hat{D}_L) < 0.$$

Since $W'(0) > 0$ and $W'(\hat{D}_L) < 0$, the optimum D_L must be in $(0, \hat{D}_L)$.

Appendix B: Estimating spread curves

To estimate spread curves, we follow a modified version of the procedure developed by Nelson and Siegel (1987) to estimate yields. At date t we have a sample of J coupon bonds, with various coupon and maturity characteristics. Let $\hat{P}_{t,j}$ be the estimated price at time t of the emerging market bond j with coupons $\{c_{j,t+k}\}_{k=1}^{\tau}$ and maturity τ_j. Price $\hat{P}_{t,j}$ can be written as

$$\hat{P}_{t,j}\left(\bar{a}_t\right) = \sum_{k=1}^{\tau_j} e^{-k y_{t,k}(\bar{a}_t)} c_{j,t+k} + e^{-\tau_j y_{t,\tau_j}(\bar{a}_t)}, \tag{1}$$

where $y_{t,k}(\bar{a}_t)$ is the yield on a zero-coupon bond of maturity k; $\bar{a}_t \equiv (a_{t,0}, ..., a_{t,3})$ is a vector of time-varying parameters.

We decompose the yield $y_{t,k}(\bar{a}_t)$ as

$$y_{t,k}(\bar{a}_t) = y^*_{t,k}(\bar{a}^*_t) + s_{t,k}(\bar{a}_t),$$

where $y^*_{t,k}$ is the zero-coupon yield on a default-free German or U.S. bond (depending on the currency denomination of the original bond) and $s_{t,k}$ is the zero-coupon spread. We express the spread $s_{t,k}$ as

$$s_{t,k}(\bar{a}_t) = a_{t,0} + a_{t,1}\left(\frac{1-e^{-ka_{t,3}}}{ka_{t,3}}\right) + a_{t,2}\left(\frac{1-e^{-ka_{t,3}}}{ka_{t,3}} - e^{-ka_{t,3}}\right). \tag{2}$$

We proceed with the estimation in two steps. First, we compute the yields on default-free German and U.S. bonds, $y^*_{t,k}$. To do that, we use German and U.S. bond prices and estimate the parameters $\bar{a}^*_t$ using an expression analogous to (2). In the second step, we use the yields $y^*_{t,k}$ derived in the first step and expression (2) to estimate the parameters $\bar{a}_t$. In both steps, we use non-linear least squares (NLLS) period by period. For example, in the second step, we take the J bonds available for a given emerging country at each date t and find the $\bar{a}_t$ that minimizes

$$\sum_{j=1}^{J}\left(P_{t,j} - \hat{P}_{t,j}\left(\bar{a}_t\right)\right)^2,$$

where $P_{t,j}$ is the price of bond j at time t.

The approximation is parsimonious and gives a good fit of the data. This type of approximation has other advantages. It allows us to include bonds denominated in different currencies, using most of the available information to obtain a better fit of the curve.[43] Finally, expression (2) has a simple interpretation. Spreads can be viewed as having three components. The constant is a long-term, level component. The second term is a short-term component as it starts at one and decays monotonically and quickly to zero. The third term can be interpreted as a "hump" or medium-term component, which starts at zero, increases, and then goes to zero. Small values of $a_{t,3}$ generate a slow decay and can better fit the curve at long maturities. We adopt this specific parametrization of the yield curve and fix $a_{t,3} = 0.005$ following Diebold and Li (2002); this helps in the convergence of the NLLS estimation described above.[44]

Once we have computed yields and spreads, we calculate prices and excess returns. The price of any coupon bond can simply be obtained using (1). But to compute excess returns, one needs to compare the returns of an emerging market bond to those of a comparable risk-less bond. Using bonds with the same maturity and coupon structure can be misleading because the yields on emerging market bonds tend to be much higher than those on risk-less bonds, affecting significantly the payments profile and duration. In particular, the high yield on an emerging market bond means that its short-run payments carry more weight in the bond valuation. Therefore, its duration will be much shorter than that of a similar U.S. bond.

In this paper, we deal with this problem using two different approaches. The two approaches lead to similar expressions for excess returns and to very similar results. The first approach consists in calculating separately the returns on an emerging market bond and on a comparable German or U.S. bond. Then, one subtracts the returns on the risk-less bonds from those on the risky bonds. The difficulty lies in constructing the comparable risk-less bond. We proceed in the following way. We take a given coupon bond for the emerging economy, and construct a portfolio of risk-less bonds with the same time profile of payments. For a given emerging market bond with coupons $\{c_{t+k}\}$ and maturity τ, we derive the weights $\omega_{t,k} = \frac{e^{-ky_{t,k}}}{P_t} c_{t+k}$ for $k = 1, ..., n-1$, and $\omega_{t,n} = \frac{e^{-\tau y_{t,\tau}}}{P_t} (c_{t+\tau} + 1)$.

[43] For the countries and periods in which a comparison is feasible, we found similar results when estimating spreads by calculating first the yield curve for each country (using only bonds in one currency) and then subtracting the corresponding yield curve for Germany or the U.S. In addition, we compared our results with EMBI spreads on long-term bonds, which are compiled by J.P. Morgan, obtaining similar values.

[44] We chose this value of $a_{t,3}$ after experimenting with different alternatives, which generated similar results.

Then we construct a portfolio of risk-less zero-coupon bonds $\{\theta_{t,k}\}$, such that $\frac{e^{-ky^*_{t,k}}}{P^*_t}\theta_{t,k} = \omega_{t,k}$ for each k. The price of this portfolio will be

$$P^*_t = \sum_{k=1}^{n} e^{-ky^*_{t,k}}\theta_{t,k}.$$

In this way the emerging market bond and the U.S. portfolio have an identical time profile of payments and an identical duration, equal to $\sum_{k=1}^{n} k\omega_{t,k}$.

The realized excess returns in period t take the form[45]

$$\begin{aligned} er_{t,\tau} &= \frac{P_{t+1,\tau-1}}{P_{t,\tau}} - \frac{P^*_{t+1}}{P^*_t} = \\ &= \sum_{k=1}^{n} \omega_{t,k}\left[e^{-\left[(k-1)\left(y_{t+1,k-1}+s_{t+1,k-1}\right)-k\left(y_{t,k}+s_{t,k}\right)\right]} - e^{-\left[(k-1)y_{t+1,k-1}-ky_{t,k}\right]}\right]. \end{aligned} \quad (3)$$

Notce that the expression in brackets represents the excess returns on a zero-coupon bond. Therefore, the expression for excess returns is a weighted average of excess returns on zero-coupon bonds.

The second approach is to use only spreads $s_{t,k}$. We compute the "spread-based" prices

$$P^s_{t,\tau} = \sum_{k=1}^{\tau} e^{-ks_{t,k}(\bar{a}_t)}c_{t+k} + e^{-\tau s_{t,\tau}(\bar{a}_t)},$$

and obtain the excess returns

$$\widehat{er}_{t,\tau} = \frac{P^s_{t+1,\tau-1}}{P^s_{t,\tau}} - 1.$$

The spread-based excess returns $\widehat{er}_{t,\tau}$ can also be interpreted as a weighted average of returns on zero-coupon bonds, but the weights $\omega_{t,k}$ are slightly different from those in (3). Both approaches are valid, in the sense that both approaches give us excess returns that can be obtained with the appropriate portfolio of emerging market and risk-free bonds. Their interpretation are slightly different: while the first approach is easier to interpret in terms of the financial strategy involved, the second one is easier to interpret in terms of the behavior of spreads.

Using prices derived from spreads to calculate excess returns has an important practical advan-

[45] This expression holds for a bond that pays no coupon in period $t + 1$. If the bond pays a coupon in period $t + 1$ the expression is easily adjusted.

tage. Since we work with bonds denominated in different currencies, we avoid the need to report every result for both dollar and deutsche mark/euro bonds. The reason is that while $P_{t,\tau}$ depends on the currency of choice, $P^s_{t,\tau}$ can be computed only from spreads. All the results reported in the paper are based on spread-based prices. We have also computed excess returns using the first method and obtained very similar results.[46]

[46] If we restricted ourselves to zero-coupon bonds, the excess returns obtained using the two approaches would be identical. However, almost all the emerging market bonds used in the estimation of the yield curve are coupon bonds, so we prefer to derive returns for coupon bonds.

Figure 1
Comparative Statics

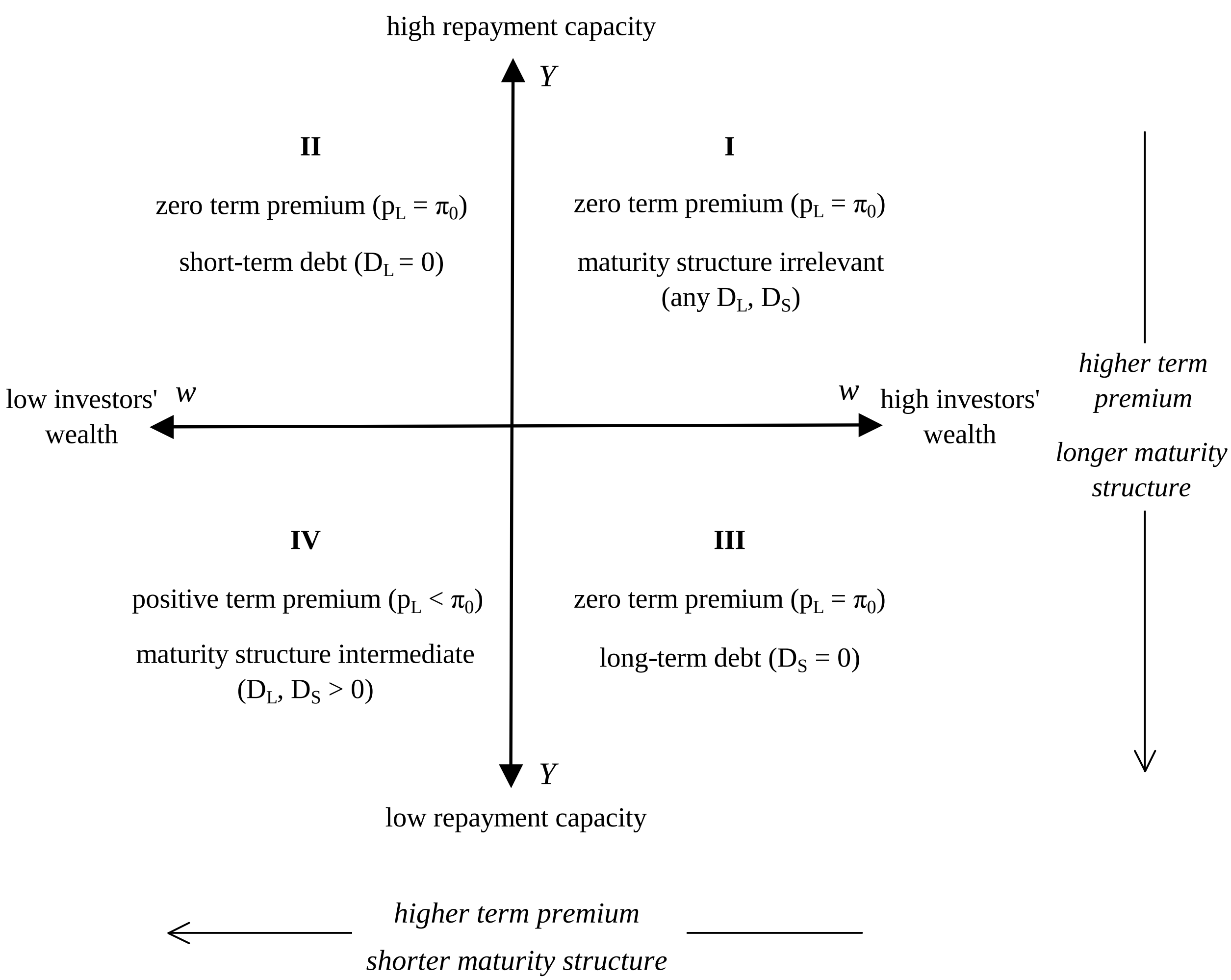
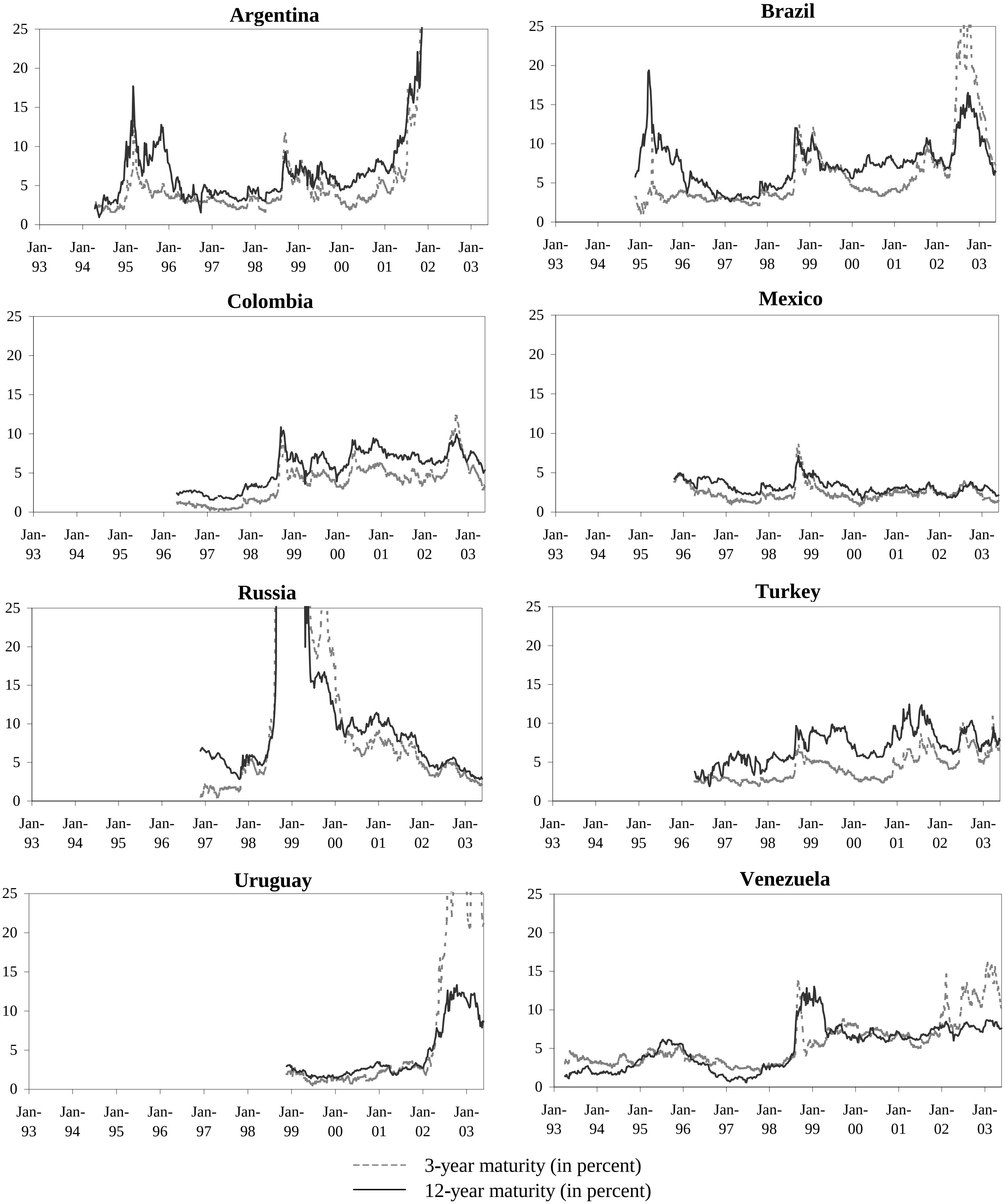
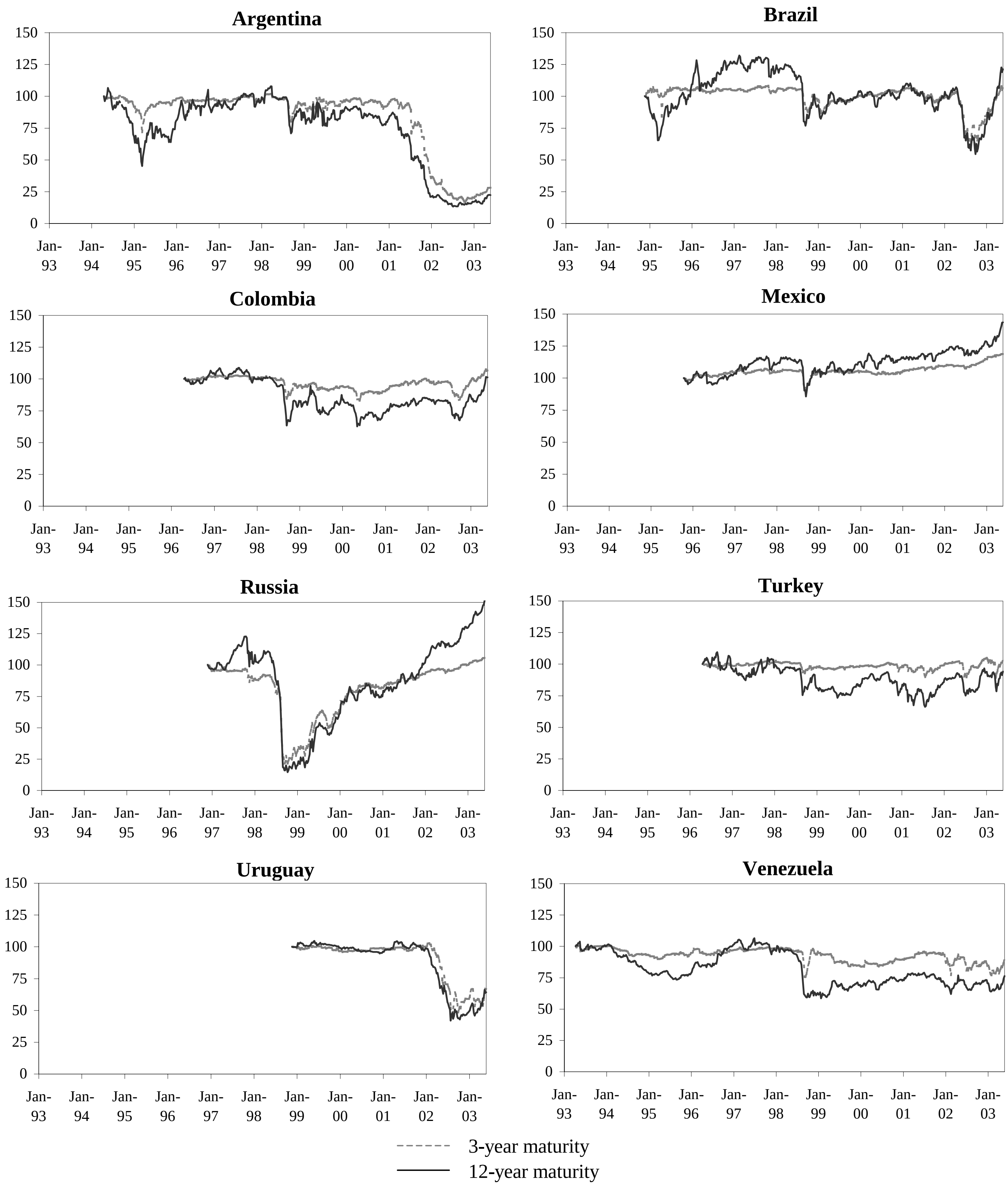


Figure 2
Short- and Long-Term Spreads



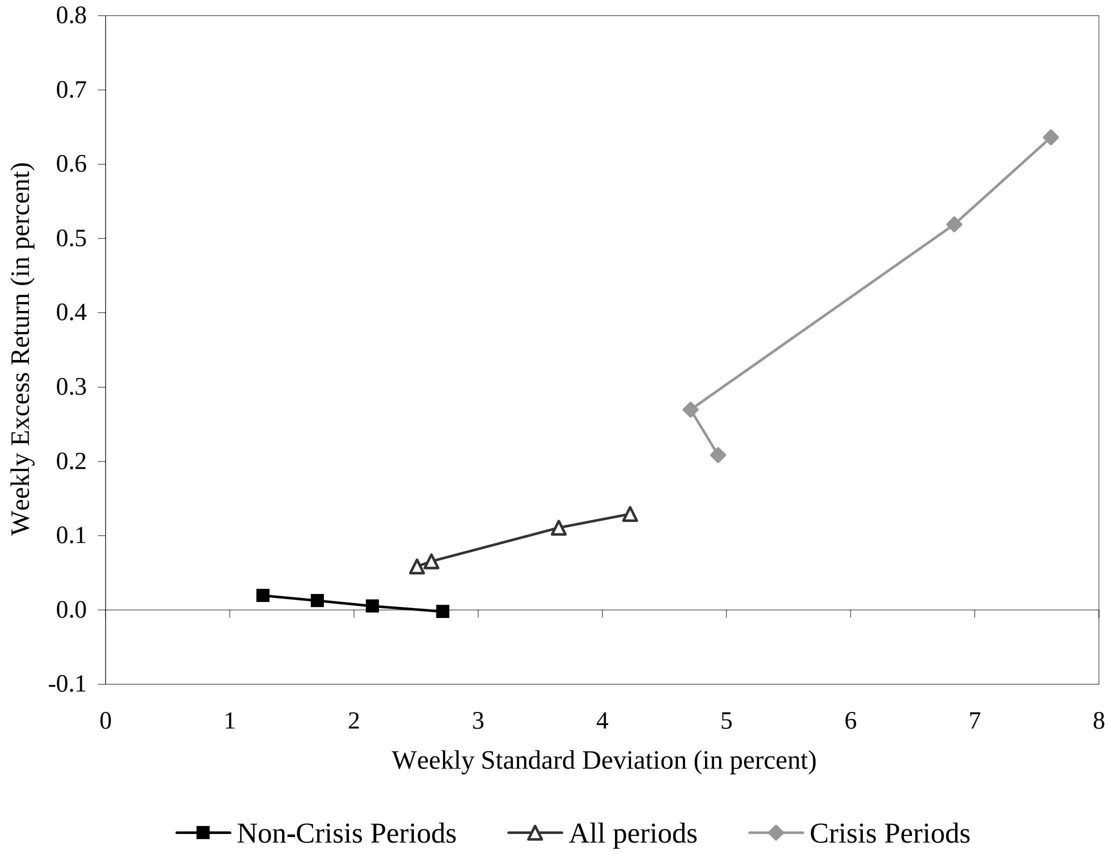
The figures show spreads of 3-year and 12-year maturities over time by country.

Figure 3
Short- and Long-Term Prices



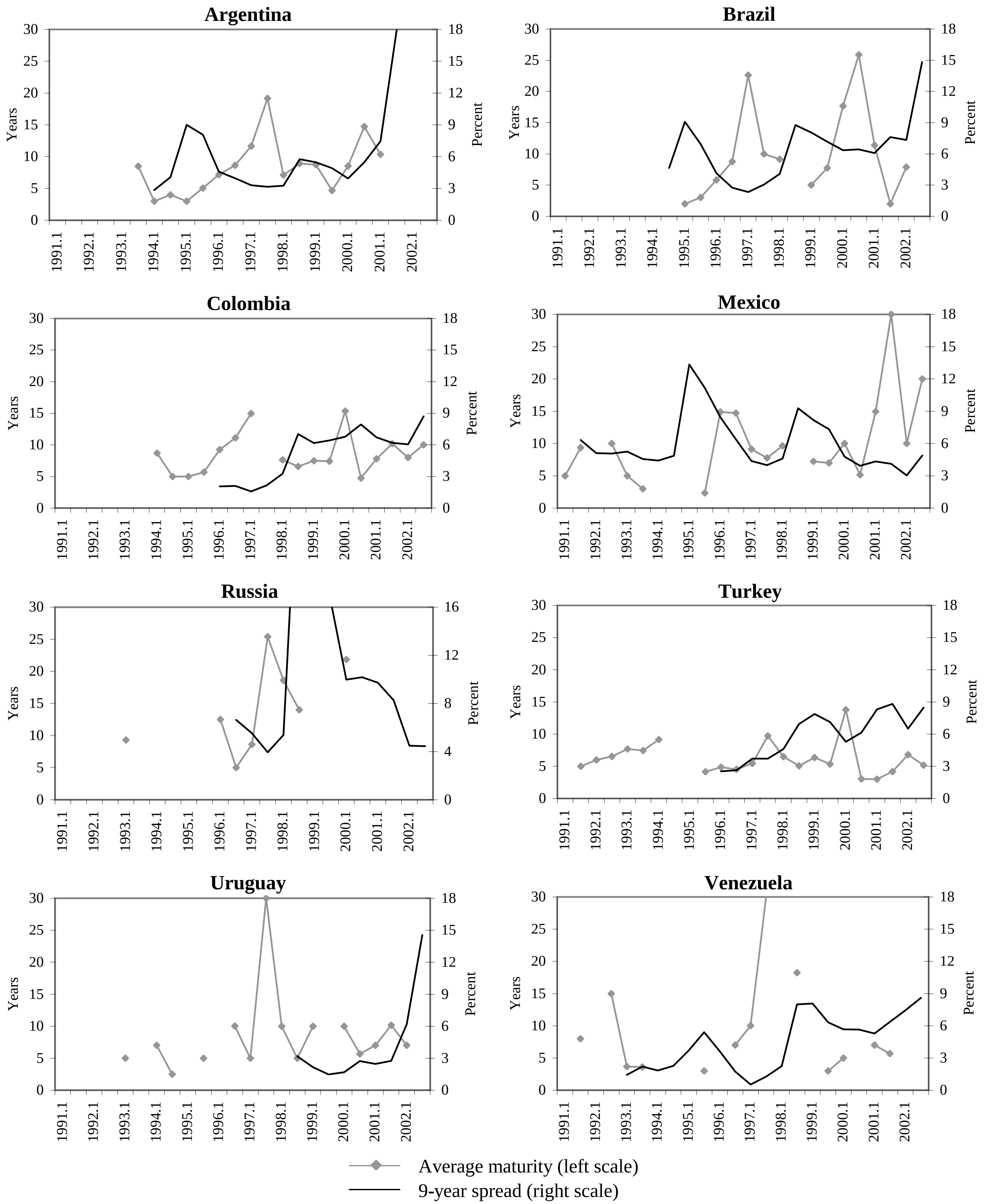
The figures show indices of prices of 3-year and 12-year maturities over time by country. Prices are estimated assuming a coupon rate of 7.5 percent and using U.S. yields as a benchmark. The indices are constructed by fixing the first observation in each country equal to 100.

Figure 4
Sharpe Ratio During Crisis and Non-Crisis Periods



The figure shows the Sharpe ratio corresponding to maturities of 3, 6, 9, and 12 years during crisis periods, non-crisis periods, and all periods. Excess returns are estimated using a holding period of one week and assuming a coupon rate of 7.5 percent. Crisis and non-crisis periods are determined according to definition 1.

Figure 5
Average Maturity and Spreads



The figures show the average maturity of bonds issued in each semester and the estimated spread of maturity of 9 years by country. In the case of Mexico, the EMBI spread is used instead of the estimated spread.

Table 1
Data Description

Price Data					
		Number of	Maturities		
Country	Sample Period	Bonds	Minimum	Maximum	75th Percentile
Argentina	Apr 1994 - May 2003	63	1.0	23.6	8.3
Brazil	Nov 1994 - May 2003	38	1.5	29.5	13.4
Colombia	Apr 1996 - May 2003	21	1.3	25.7	9.7
Mexico	Oct 1995 - May 2003	26	1.5	27.5	12.7
Russia	Nov 1996 - May 2003	21	2.2	24.2	10.7
Turkey	Apr 1996 - May 2003	49	0.8	17.9	5.3
Uruguay	Nov 1998 - May 2003	10	1.8	26.4	9.2
Venezuela	Apr 1993 - May 2003	22	1.4	26.2	15.7
Germany	Apr 1993 - May 2003	229	0.6	20.0	5.9
U.S.	Apr 1993 - May 2003	51	1.5	29.4	23.2

Quantity Data						
			Average Amount Issued by Maturity (USD Thousands)			
Country	Sample Period	Number of Bonds	Up to 3 Years	From 3 to 6 Years	From 6 to 9 Years	Over 9 Years
Argentina	Jul 1993 - Dec 2002	146	17,731	59,388	29,898	60,008
Brazil	Jul 1994 - Dec 2002	45	7,557	29,273	9,246	57,959
Colombia	Jan 1993 - Dec 2002	41	1,087	9,080	3,797	13,567
Mexico	Jan 1991 - Dec 2002	54	5,941	14,798	7,887	39,836
Russia	Jan 1993 - Dec 2002	27	3,513	10,010	12,839	49,757
Turkey	Jan 1990 - Dec 2002	77	4,944	22,436	8,294	17,415
Uruguay	Jan 1993 - Dec 2002	18	195	1,811	970	3,899
Venezuela	Jul 1991 - Dec 2002	24	2,406	1,524	2,239	9,305

The tables describe the price and quantity data used in the paper. The top table shows the sample periods, number of bonds, and maturities covered by the price data. Maturities are expressed in years. Minimum, maximum, and 75th percentile correspond to the average minimum, maximum, and 75th percentile maturity over time within the sample period. The bottom table shows the sample periods, number of bonds, and average amount issued by maturity covered by the quantity data. Maturity up to 3 years includes bonds of 3-year maturity, maturity from 3 to 6 years includes bonds of 6-year maturity, and maturity from 6 to 9 years includes bonds of 9-year maturity. USD stands for U.S. dollars.

Table 2
Excess Returns
Annualized Means Over Comparable German and U.S. Bonds, In Percent

	Coupon = 5%				Coupon = 7.5%				Coupon = 10%			
	er3	**er6**	**er9**	**er12**	**er3**	**er6**	**er9**	**er12**	**er3**	**er6**	**er9**	**er12**
Average	2.90	3.49	6.74	8.26	3.08	3.45	5.93	6.95	3.23	3.44	5.46	6.27
Argentina	-7.08	-4.21	0.55	0.48	-6.34	-4.02	-0.31	-0.98	-5.71	-3.85	-0.81	-1.63
Brazil	6.02	6.34	9.28	12.69	6.04	6.21	8.60	11.34	6.06	6.12	8.16	10.52
Colombia	4.67	4.41	4.11	4.50	4.61	4.34	4.03	4.28	4.57	4.30	3.99	4.15
Mexico	3.56	5.25	6.72	7.89	3.52	5.08	6.40	7.43	3.49	4.95	6.17	7.11
Russia	14.84	18.73	39.72	45.96	15.09	18.03	33.43	37.57	15.31	17.54	30.01	33.53
Turkey	4.09	3.78	4.52	6.92	4.09	3.77	4.32	6.11	4.09	3.77	4.21	5.63
Uruguay	-2.72	-5.21	-5.33	-5.74	-2.51	-4.93	-5.22	-5.69	-2.32	-4.70	-5.11	-5.61
Venezuela	2.50	1.05	1.10	1.74	2.63	1.21	1.18	1.59	2.74	1.35	1.25	1.53

The table shows the annualized means of excess returns over comparable German and U.S. bonds, by country and across countries. Excess returns are estimated using a holding period of one week and for coupon rates of 5, 7.5, and 10 percent. er3, er6, er9, and er12 stand for 3-, 6-, 9-, and 12-year excess returns.

Table 3
Crisis Periods

Crisis Definition 1

	Start date	End date
Argentina		
Crisis 1	12/30/94	01/12/96
Crisis 2	09/04/98	11/06/98
Crisis 3	07/13/01	-
Brazil		
Crisis 1	01/20/95	10/06/95
Crisis 2	08/21/98	04/23/99
Crisis 3	06/14/02	04/06/03
Colombia		
Crisis 1	08/28/98	02/26/99
Crisis 2	05/05/00	06/23/00
Crisis 3	07/26/02	11/15/02
Mexico		
Crisis 1	08/28/98	11/06/98
Russia		
Crisis 1	07/10/98	06/29/01
Turkey		
Crisis 1	08/28/98	11/13/98
Uruguay		
Crisis 1	04/19/02	-
Venezuela		
Crisis 1	08/14/98	03/03/00

We use four different crisis definitions. Crisis definition 1 sets the beginning of a crisis when 9-year spreads are greater than a threshold, which is defined as the average spread over the previous six months plus 300 basis points. The end of the crisis is at the end of the first four-week period in which spreads have remained below the threshold used to determine the beginning of the crisis. Crisis definition 2 is similar to crisis definition 1, but uses 400 basis points to define the threshold. Crisis definitions 3 and 4 are similar, but use a period of one week instead of a period of four weeks to end the crisis.

Table 4
Excess Returns During Crisis and Non-Crisis Periods
Annualized Means Over Comparable German and U.S. Bonds, In Percent

	er3	**er6**	**er9**	**er12**
All Periods	3.08	3.45	5.93	6.95
Crisis Definition 1				
Threshold + 300 basis points, ending crisis after four weeks of low spreads				
Crisis Periods	11.43	15.03	30.88	39.06
Non-Crisis Periods	1.02	0.65	0.26	-0.11
Crisis Definition 2				
Threshold + 400 basis points, ending crisis after four weeks of low spreads				
Crisis Periods	11.47	16.85	42.50	55.70
Non-Crisis Periods	1.85	1.54	1.20	0.94
Crisis Definition 3				
Threshold + 300 basis points, ending crisis after one week of low spreads				
Crisis Periods	10.31	13.39	33.38	42.67
Non-Crisis Periods	1.86	1.80	1.73	1.66
Crisis Definition 4				
Threshold + 400 basis points, ending crisis after one week of low spreads				
Crisis Periods	11.67	20.32	52.03	66.03
Non-Crisis Periods	2.05	1.52	1.24	1.20

The table shows the annualized means of excess returns over comparable German and U.S. bonds during crisis and non-crisis periods across countries. Results are presented for the four crisis definitions. Excess returns are estimated using a holding period of one week and assuming a coupon rate of 7.5 percent. er3, er6, er9, and er12 stand for 3-, 6-, 9-, and 12-year excess returns.

Table 5
Excess Returns During Crisis and Non-Crisis Periods by Country
Annualized Means Over Comparable German and U.S. Bonds, In Percent

	Crisis Definition 1			
	er3	**er6**	**er9**	**er12**
Average				
Crisis Periods	11.43	15.03	30.88	39.06
Non-Crisis Periods	1.02	0.65	0.26	-0.11
Argentina				
Crisis Periods	-10.03	-3.47	11.81	15.87
Non-Crisis Periods	-4.36	-4.30	-6.10	-8.78
Brazil				
Crisis Periods	18.36	25.98	41.73	58.11
Non-Crisis Periods	1.95	-0.10	-1.30	-1.85
Colombia				
Crisis Periods	22.96	33.98	39.79	42.73
Non-Crisis Periods	1.85	0.10	-0.95	-1.02
Mexico				
Crisis Periods	81.03	82.56	90.33	113.92
Non-Crisis Periods	1.88	3.43	4.64	5.32
Russia				
Crisis Periods	35.06	31.06	62.37	70.75
Non-Crisis Periods	0.38	7.93	12.80	14.35
Turkey				
Crisis Periods	21.66	61.44	109.15	162.47
Non-Crisis Periods	3.55	2.24	1.90	2.91
Uruguay				
Crisis Periods	-6.03	-9.76	-6.61	-4.78
Non-Crisis Periods	-1.35	-3.34	-4.78	-5.98
Venezuela				
Crisis Periods	5.61	6.89	13.61	23.21
Non-Crisis Periods	2.09	0.20	-0.95	-1.95

The table shows the annualized means of excess returns over comparable German and U.S. bonds during crisis and non-crisis periods by country. Crisis and non-crisis periods are determined according to definition 1. Excess returns are estimated using a holding period of one week and assuming a coupon rate of 7.5 percent. er3, er6, er9, and er12 stand for 3-, 6-, 9-, and 12-year excess returns.

Table 6

Explaining Long-Short Excess Returns

	Dependent Variable: er9-er3				Dependent Variable: er12-er3					Dependent Variable: er12-er6			
Crisis Dummy	0.325 ***				0.449 ***					0.381 ***			
	[5.809]				[7.151]					[6.868]			
3-Year Spread		0.015 ***				0.016 ***							
		[4.816]				[5.539]							
6-Year Spread			0.040 ***				0.045 ***				0.035 ***		
			[10.219]				[9.576]				[6.052]		
9-Year Spread				0.062 ***				0.069 ***				0.072 ***	
				[8.229]				[10.587]				[3.753]	
12-Year Spread									0.060 ***				0.075 ***
									[10.562]				[3.498]
Country Dummies	no	no	no	no	no	no	no	no	no	no	no	no	no
Time Dummies	no	no	no	no	no	no	no	no	no	no	no	no	no
Observations	3153	3153	3153	3153	3,153	3,153	3,153	3,153	3,153	3,153	3,153	3,153	3,153
R-squared	0.002	0.003	0.006	0.013	0.003	0.002	0.005	0.01	0.013	0.002	0.003	0.013	0.022
Number of Countries	8	8	8	8	8	8	8	8	8	8	8	8	8

	Dependent Variable: er9-er3				Dependent Variable: er12-er3					Dependent Variable: er12-er6			
Crisis Dummy	0.290 ***				0.407 ***					0.295 ***			
	[4.441]				[6.985]					[5.188]			
3-Year Spread		0.013 ***				0.012 ***							
		[6.096]				[4.766]							
6-Year Spread			0.040 ***				0.039 ***				0.029 ***		
			[6.317]				[6.353]				[7.855]		
9-Year Spread				0.072 ***				0.073 ***				0.083 ***	
				[5.714]				[6.436]				[3.243]	
12-Year Spread									0.062 ***				0.087 ***
									[8.442]				[3.569]
Country Dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time Dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	3,153	3,153	3,153	3,153	3,153	3,153	3,153	3,153	3,153	3,153	3,153	3,153	3,153
R-squared	0.265	0.265	0.267	0.273	0.286	0.285	0.287	0.291	0.293	0.225	0.226	0.234	0.243
Number of Countries	8	8	8	8	8	8	8	8	8	8	8	8	8

The tables report ordinary least squares regressions of weekly long-short excess returns on a crisis dummy and on spreads of different maturities. The long-short excess returns are the differences between the 9-year excess return and the 3-year excess return (er9-er3), between the 12-year excess return and the 3-year excess return (er12-er3), and between the 12-year excess return and the 6-year excess return (er12-er6). Excess returns are estimated using a holding period of one week and assuming a coupon rate of 7.5 percent. The crisis dummy corresponds to crisis definition 1. The standard errors are robust to heteroskedasticity and serial correlation. Observations are assumed to be independent across clusters but not within clusters. Clusters are defined by country and crisis periods. Regressions in the bottom table include country and time dummies. Robust t statistics are in brackets. *, **, and ***: significant at 10, 5, and 1 percent, respectively.

Table 7
Amount Issued

	Dependent Variable: Issues of Maturity Up to 3 Years					Dependent Variable: Issues of Maturity Between 3 and 6 Years				
Crisis Dummy	-0.528					-2.947 ***				
	[1.087]					[2.662]				
3-Year Spread		-0.066 *					-0.189 **			
		[1.729]					[2.311]			
9-Year Spread			-0.043					-0.133 **		
			[1.097]					[2.321]		
EMBI				-0.027					-0.121	
				[1.007]					[1.619]	
Predicted Term Premium					0.087					-0.455
(er9-er3)					[0.183]					[0.816]
Observations	2,996	2,996	2,996	2,647	2,996	2,996	2,996	2,996	2,647	2,996
Uncensored Observations	46	46	46	48	46	109	109	109	86	109

	Dependent Variable: Issues of Maturity Between 6 and 9 Years					Dependent Variable: Issues of Maturity Over 9 Years				
Crisis Dummy	-1.973 ***					-2.180 ***				
	[3.008]					[4.500]				
3-Year Spread		-0.145 *					-0.257 **			
		[1.940]					[2.227]			
9-Year Spread			-0.141 ***					-0.223 ***		
			[2.729]					[4.501]		
EMBI				-0.148 *					-0.223 **	
				[1.933]					[2.172]	
Predicted Term Premium					-0.692					-1.230 ***
(er9-er3)					[1.434]					[3.975]
Observations	2,996	2,996	2,996	2,647	2,996	2,996	2,996	2,996	2,647	2,996
Uncensored Observations	56	56	56	48	56	103	103	103	87	103

The tables report the marginal coefficients of Tobit regressions of the amount issued at different maturities on a crisis dummy, short-term and long-term spreads, the EMBI, and the predicted term premium. Regressions are estimated by maximum likelihood. The dependent variables are normalized by the average weekly amount issued, short-term or long-term respectively, for each country. Maturity up to 3 years includes bonds of 3-year maturity, maturity from 3 to 6 years includes bonds of 6-year maturity, and maturity from 6 to 9 years includes bonds of 9-year maturity. The independent variables are in logs. The crisis dummy corresponds to crisis definition 1. The standard errors are robust to heteroskedasticity and serial correlation. Observations are assumed to be independent across clusters but not within clusters. Clusters are defined by country and crisis periods. Regressions using the EMBI do not include Uruguay due to data availability. Robust z statistics are in brackets. *, **, and ***: significant at 10, 5, and 1 percent, respectively.

Table 8
Average Maturity

Dependent Variable: Average Maturity of Issues				
Main Equation				
9-Year Spread	-0.476 **	-0.590 ***	-0.332 **	-0.399 **
	[2.287]	[4.730]	[2.116]	[2.000]
Selection Equation				
Crisis Dummy	-0.149 **			
	[2.033]			
3-Year Spread		-0.032 ***		
		[2.985]		
9-Year Spread			-0.089 ***	
			[4.550]	
EMBI				-0.066 ***
				[3.704]
Country Dummies	yes	yes	yes	yes
Observations	2,996	2,996	2,996	2,338

Dependent Variable: Average Maturity of Issues				
Main Equation				
Predicted Term Premium	-2.724 **	-2.696 ***	-5.554 ***	-2.103 ***
(er9-er3)	[2.316]	[3.238]	[4.904]	[3.029]
Selection Equation				
Crisis Dummy	-0.191 **			
	[2.212]			
3-Year Spread		-0.031 ***		
		[3.005]		
9-Year Spread			-0.065 ***	
			[3.352]	
EMBI				-0.066 ***
				[3.764]
Country Dummies	yes	yes	yes	yes
Observations	2,996	2,996	2,996	2,338

The tables report selection bias regressions of the average maturity of issues on long-term spreads and the predicted term premium. In the selection equation, the decision to issue is explained by a crisis dummy, short- and long-term spreads, and the EMBI. Regressions are estimated by maximum likelihood. The independent variables are in logs. The crisis dummy corresponds to crisis definition 1. The standard errors are robust to heteroskedasticity and serial correlation. Observations are assumed to be independent across clusters but not within clusters. Clusters are defined by country and crisis periods. All regressions include country dummies. Regressions using the EMBI do not include Uruguay due to data availability. Robust z statistics are in brackets. *, **, and ***: significant at 10, 5, and 1 percent, respectively.

Appendix Table 1
Description of Emerging Market Bonds Included in the Sample

Bond	Issue Date	Maturity Date	Amount Issued (USD Thousands)	Currency	Market	Coupon	Coupon Frequency	Data Available
					Argentina			
1	10/15/92	10/15/97	250,000	USD	Eurobond	8.25	A	Price / Quantity
2	08/02/93	08/02/96	150,000	USD	Eurobond	6.875	S	Price / Quantity
3	08/02/93	08/02/00	100,000	USD	Eurobond	8.25	S	Price / Quantity
4	10/05/93	10/05/98	608,580	DM	Eurobond	8	A	Price / Quantity
5	11/05/93	03/29/05	8,466,548	USD	Brady Bond	Floating	S	Price
6	12/20/93	12/20/03	2,050,000	USD	Global	8.375	S	Price / Quantity
7	03/04/94	03/06/95	350,000	USD	Eurobond	Floating	N.A.	Quantity
8	04/01/94	04/01/04	100,000	USD	Eurobond	7.9	A	Quantity
9	07/11/94	07/11/97	312,538	DM	Eurobond	8	A	Quantity
10	08/22/94	08/27/97	100,000	USD	Eurobond	Floating	Q	Price / Quantity
11	08/26/94	08/26/97	67,688	ATS	Eurobond	8	A	Quantity
12	10/14/94	10/14/97	73,562	CAD	Eurobond	10.5	A	Quantity
13	10/21/94	10/21/97	288,453	ITL	Eurobond	13.45	A	Quantity
14	11/01/94	11/01/99	500,000	USD	Global	10.95	S	Price / Quantity
15	11/01/94	11/01/01	52,000	USD	Domestic	Floating	A	Quantity
16	12/09/94	12/09/97	75,720	ESP	Eurobond	12.8	A	Quantity
17	12/15/94	12/15/99	149,815	JPY	Eurobond	7.1	A	Quantity
18	12/19/94	12/19/97	199,753	JPY	Eurobond	6	A	Quantity
19	12/28/94	12/28/10	23,674	USD	Domestic	Floating	M	Quantity
20	01/06/95	01/06/98	187,463	FRF	Eurobond	9.875	A	Quantity
21	08/29/95	08/29/00	795,153	DM	Eurobond	9.25	A	Price / Quantity
22	11/09/95	11/09/98	130,905	CHF	Eurobond	7.125	A	Quantity
23	11/14/95	11/14/02	704,460	EUR	Eurobond	10.5	A	Quantity
24	11/23/95	11/14/02	177,493	DM	Eurobond	10.5	A	Quantity
25	11/29/95	03/25/99	441,534	JPY	Eurobond	5	A	Quantity
26	12/06/95	12/28/98	49,297	ATS	Eurobond	8.5	A	Quantity
27	12/27/95	06/27/97	137,504	JPY	Eurobond	3.25	S	Quantity
28	02/06/96	02/06/03	676,200	EUR	Eurobond	10.25	A	Quantity
29	02/20/96	02/23/01	1,100,000	USD	Global	9.25	S	Price / Quantity
30	03/06/96	03/06/01	321,473	ITL	Eurobond	13.25	A	Quantity
31	04/04/96	04/04/06	74,993	JPY	Eurobond	7.4	A	Quantity
32	04/10/96	04/10/06	676,652	DM	Eurobond	11.25	A	Price / Quantity
33	04/15/96	09/01/02	99,341	EUR	Eurobond	12.625	A	Quantity
34	04/18/96	04/18/01	95,200	ATS	Eurobond	9	A	Quantity
35	04/25/96	04/25/06	74,444	JPY	Eurobond	7.4	A	Quantity
36	05/07/96	03/27/01	845,499	JPY	Eurobond	5.5	A	Quantity
37	05/15/96	05/15/06	65,761	JPY	Eurobond	7.4	A	Quantity
38	05/20/96	05/20/99	326,146	DM	Eurobond	7	A	Price / Quantity
39	05/20/96	05/20/11	645,360	EUR	Eurobond	11.75	A	Quantity
40	06/25/96	06/25/99	227,505	ITL	Eurobond	11	A	Quantity
41	07/05/96	07/05/99	147,589	NLG	Eurobond	7.625	A	Quantity
42	08/14/96	08/14/01	155,302	GBP	Eurobond	11.5	A	Quantity
43	08/15/96	08/19/99	500,000	USD	Eurobond	Floating	Q	Price / Quantity
44	09/19/96	09/19/03	248,363	DM	Eurobond	9	A	Price / Quantity
45	09/19/96	09/19/16	248,363	DM	Eurobond	12	A	Quantity
46	10/09/96	10/09/06	1,300,000	USD	Global	11	S	Price / Quantity
47	11/05/96	11/05/03	329,903	ITL	Eurobond	11	A	Quantity
48	11/12/96	03/24/05	445,407	JPY	Eurobond	6	A	Quantity
49	11/13/96	11/13/26	329,078	DM	Eurobond	11.75	A	Quantity
50	12/04/96	12/04/03	230,357	CHF	Eurobond	7	A	Quantity

Bond	Issue Date	Maturity Date	Amount Issued (USD Thousands)	Currency	Market	Coupon	Coupon Frequency	Data Available
51	12/05/96	12/20/02	444,286	JPY	Eurobond	5	S	Quantity
52	12/13/96	12/13/98	500,000	USD	Domestic	8	S	Quantity
53	12/20/96	12/20/02	439,504	JPY	Eurobond	5	N.A.	Quantity
54	12/23/96	02/23/05	643,561	DM	Eurobond	8.5	A	Price / Quantity
55	01/03/97	01/03/07	385,990	ITL	Eurobond	10	A	Quantity
56	01/30/97	01/30/17	3,287,500	USD	Global	11.375	S	Price / Quantity
57	03/18/97	03/18/04	898,382	DM	Eurobond	7	A	Price / Quantity
58	04/09/97	03/18/04	83,852	ATS	Eurobond	7	A	Quantity
59	05/08/97	05/27/04	449,785	JPY	Eurobond	4.4	S	Quantity
60	05/09/97	05/09/02	2,292,000	USD	Domestic	8.75	S	Quantity
61	05/23/97	05/23/02	138,569	ESP	Eurobond	7.5	A	Quantity
62	05/27/97	05/27/04	295,869	ITL	Eurobond	Floating	Q	Quantity
63	05/27/97	05/27/04	420,198	JPY	Eurobond	4.4	S	Quantity
64	06/25/97	06/25/07	330,785	GBP	Eurobond	10	A	Quantity
65	08/11/97	08/11/07	416,948	ITL	Eurobond	7.625	A	Quantity
66	09/19/97	09/19/27	2,500,000	USD	Global	9.75	S	Quantity
67	10/17/97	10/16/98	500,000	USD	Domestic	0	Z	Price
68	10/21/97	03/18/04	435,325	ITL	Eurobond	7	A	Quantity
69	10/24/97	03/18/04	217,845	ITL	Eurobond	7	A	Quantity
70	10/30/97	10/30/09	570,169	DM	Eurobond	8	A	Price / Quantity
71	12/16/97	11/30/02	500,000	USD	Yankee	9.5	S	Quantity
72	12/22/97	12/22/00	158,580	ITL	Eurobond	8	A	Quantity
73	01/14/98	01/20/01	1,563,000	USD	Domestic	Floating	N.A.	Quantity
74	02/04/98	02/04/03	663,790	EUR	Eurobond	8.75	A	Quantity
75	02/26/98	02/26/08	822,684	EUR	Eurobond	Step Down	A	Price / Quantity
76	03/12/98	10/30/09	416,914	ITL	Eurobond	8	A	Quantity
77	04/03/98	02/26/08	244,577	EUR	Eurobond	8	A	Price / Quantity
78	04/03/98	02/26/08	249,335	EUR	Eurobond	8	A	Quantity
79	04/13/98	04/10/05	1,000,000	USD	Global	Floating	S	Quantity
80	04/21/98	04/21/08	820,829	EUR	Global	8.125	A	Price / Quantity
81	07/06/98	07/06/10	556,615	EUR	Eurobond	8.25	A	Price / Quantity
82	07/08/98	07/08/05	565,384	ITL	Eurobond	Floating	Q	Quantity
83	07/21/98	07/21/03	1,000,000	USD	Domestic	Floating	Q	Quantity
84	07/29/98	07/29/05	414,863	DM	Eurobond	7.875	A	Price / Quantity
85	07/30/98	07/30/10	554,485	EUR	Eurobond	8.5	A	Price / Quantity
86	10/16/98	09/19/27	293,450	USD	Domestic	9.9375	S	Quantity
87	11/19/98	11/19/08	299,618	DM	Eurobond	9	A	Price / Quantity
88	11/19/98	12/04/05	1,000,000	USD	Global	11	S	Quantity
89	12/04/98	12/04/05	1,000,000	USD	Global	11	S	Price / Quantity
90	01/15/99	04/15/07	48,918	USD	Domestic	Floating	Q	Quantity
91	02/04/99	02/04/03	214,198	EUR	Eurobond	8.75	A	Quantity
92	02/25/99	02/25/02	112,061	EUR	Domestic	8	A	Quantity
93	02/25/99	02/25/19	1,000,000	USD	Global	12.125	S	Price / Quantity
94	02/25/99	02/25/19	1,000,000	USD	Global	12.125	S	Quantity
95	02/26/99	02/26/08	393,623	EUR	Eurobond	Step Down	A	Price / Quantity
96	03/01/99	03/01/29	125,000	USD	Yankee	8.875	S	Quantity
97	03/04/99	03/04/04	433,182	EUR	Eurobond	9.5	A	Price / Quantity
98	03/15/99	04/06/04	300,000	USD	Private Placement	Floating	Q	Quantity
99	03/19/99	03/17/00	1,168,544	USD	Domestic	0	Z	Price
100	04/06/99	04/10/04	300,000	USD	Eurobond	Floating	Q	Price / Quantity
101	04/06/99	02/26/08	270,304	EUR	Eurobond	8	A	Price / Quantity
102	04/07/99	04/07/09	1,226,354	USD	Global	11.75	S	Price / Quantity
103	04/26/99	04/26/06	483,316	EUR	Eurobond	9	A	Price / Quantity
104	05/10/99	03/18/04	439,464	EUR	Eurobond	7	A	Price / Quantity
105	05/24/99	05/24/01	1,270,080	USD	Domestic	9.5	S	Quantity

Bond	Issue Date	Maturity Date	Amount Issued (USD Thousands)	Currency	Market	Coupon	Coupon Frequency	Data Available
106	05/24/99	05/24/04	2,640,292	USD	Domestic	11.25	S	Quantity
107	05/26/99	05/26/09	694,155	EUR	Eurobond	9	A	Price / Quantity
108	06/10/99	06/10/02	208,677	EUR	Eurobond	7.125	A	Quantity
109	07/01/99	07/01/04	681,842	EUR	Eurobond	8.5	A	Price / Quantity
110	07/22/99	07/22/03	103,489	EUR	Eurobond	Floating	S	Quantity
111	08/11/99	08/11/09	158,724	JPY	Eurobond	3.5	A	Quantity
112	09/03/99	09/03/01	585,504	EUR	Eurobond	8.5	A	Price / Quantity
113	10/14/99	05/14/01	321,199	EUR	Eurobond	7.3	Z	Quantity
114	10/15/99	10/16/00	250,000	USD	Global	0	Z	Quantity
115	10/15/99	04/15/01	250,000	USD	Global	0	Z	Quantity
116	10/15/99	10/15/01	250,000	USD	Global	0	Z	Quantity
117	10/15/99	10/15/02	250,000	USD	Global	0	Z	Quantity
118	10/15/99	10/15/03	250,000	USD	Global	0	Z	Quantity
119	10/15/99	10/15/04	250,000	USD	Global	0	Z	Quantity
120	10/21/99	10/21/02	523,341	EUR	Eurobond	9.25	A	Quantity
121	11/12/99	11/10/00	1,141,458	USD	Domestic	0	Z	Price
122	11/19/99	02/26/08	1,488,544	EUR	Eurobond	8	A	Price / Quantity
123	11/26/99	11/26/03	260,308	EUR	Eurobond	9.75	A	Price / Quantity
124	12/07/99	12/07/04	412,672	EUR	Eurobond	10	A	Price / Quantity
125	12/09/99	12/07/04	101,792	EUR	Eurobond	10	A	Quantity
126	12/11/99	01/07/05	254,091	EUR	Eurobond	10	A	Quantity
127	12/17/99	12/17/03	183,135	JPY	Eurobond	5.4	S	Quantity
128	12/22/99	12/22/04	202,196	EUR	Eurobond	Floating	Q	Quantity
129	01/07/00	01/07/05	657,455	EUR	Eurobond	10	A	Price / Quantity
130	01/07/00	01/07/05	253,362	EUR	Eurobond	N.A.	N.A.	Quantity
131	01/26/00	01/26/07	776,156	EUR	Eurobond	10.25	A	Price / Quantity
132	02/03/00	02/01/20	1,250,000	USD	Global	12	S	Price / Quantity
133	02/21/00	05/21/03	1,684,938	USD	Domestic	11.75	S	Quantity
134	02/21/00	05/21/05	1,763,641	USD	Domestic	12.125	S	Quantity
135	03/15/00	03/15/10	1,000,000	USD	Global	11.375	S	Price / Quantity
136	03/17/00	03/16/01	1,109,683	USD	Domestic	0	Z	Price
137	04/04/00	10/04/04	479,039	EUR	Eurobond	8.125	A	Price / Quantity
138	05/24/00	05/24/05	674,068	EUR	Eurobond	9	A	Price / Quantity
139	06/14/00	06/14/04	561,979	JPY	Eurobond	5.125	S	Quantity
140	06/15/00	06/15/15	2,402,700	USD	Global	11.75	S	Price / Quantity
141	06/20/00	06/20/03	940,083	EUR	Eurobond	9	A	Price / Quantity
142	07/14/00	07/13/01	1,251,560	USD	Domestic	0	Z	Price
143	07/20/00	07/20/04	949,065	EUR	Eurobond	9.25	A	Price / Quantity
144	07/21/00	07/21/30	1,250,000	USD	Global	10.25	S	Price / Quantity
145	09/07/00	09/07/07	435,722	EUR	Eurobond	10	A	Price / Quantity
146	09/26/00	09/26/05	575,595	JPY	Eurobond	4.85	S	Quantity
147	11/10/00	11/09/01	1,000,979	USD	Domestic	0	Z	Price
148	02/21/01	02/21/12	1,593,951	USD	Global	12.375	S	Price / Quantity
149	02/22/01	02/22/07	300,000	USD	Eurobond	11	S	Price / Quantity
150	06/19/01	06/19/31	8,935,311	USD	Global	12	S	Price / Quantity
151	06/19/01	06/19/31	200,000	USD	Eurobond	9.5	A	Quantity
152	06/19/01	06/19/18	7,691,791	USD	Global	12.25	S	Price / Quantity
153	06/19/01	06/19/18	463,729	EUR	Eurobond	10	A	Quantity
					Brazil			
1	10/15/88	10/15/99	670,000	USD	Restructured Debt	Floating	S	Price
2	08/31/89	09/15/13	1,000,000	USD	Restructured Debt	6	S	Price
3	11/26/92	01/01/01	7,104,960	USD	Brady Bond	Floating	S	Price
4	04/15/94	04/15/06	4,799,521	USD	Brady Bond	Floating	S	Price
5	04/15/94	04/15/09	1,737,355	USD	Brady Bond	Floating	S	Price

Bond	Issue Date	Maturity Date	Amount Issued (USD Thousands)	Currency	Market	Coupon	Coupon Frequency	Data Available
6	04/15/94	04/15/09	2,174,663	USD	Brady Bond	Floating	S	Price
7	04/15/94	04/15/14	7,387,519	USD	Brady Bond	8	S	Price
8	04/15/94	04/15/24	3,593,064	USD	Brady Bond	Floating	S	Price
9	04/15/94	04/15/24	10,631,926	USD	Brady Bond	Floating	S	Price
10	10/15/94	04/15/12	8,489,909	USD	Brady Bond	Floating	S	Price
11	06/19/95	06/19/97	946,415	JPY	Eurobond	6	A	Quantity
12	06/21/95	07/20/98	719,756	DM	Eurobond	9	A	Price / Quantity
13	10/19/95	01/06/01	70,715	DM	Eurobond	10	A	Price
14	03/22/96	03/22/01	283,509	JPY	Eurobond	5.5	S	Quantity
15	05/08/96	04/15/05	164,668	EUR	Eurobond	11	A	Price / Quantity
16	06/11/96	06/11/99	154,223	GBP	Eurobond	9.75	A	Quantity
17	10/09/96	09/15/07	1,281,699	USD	Eurobond	Floating	S	Quantity
18	11/05/96	11/05/01	750,000	USD	Global	8.875	S	Price / Quantity
19	02/05/97	02/26/07	601,900	EUR	Eurobond	8	A	Price / Quantity
20	02/26/97	02/26/07	590,338	EUR	Eurobond	8	N.A.	Quantity
21	04/25/97	05/21/02	174,124	EUR	Eurobond	6.625	A	Price / Quantity
22	04/30/97	05/21/02	208,699	EUR	Eurobond	6.625	A	Price / Quantity
23	05/07/97	05/21/02	166,905	EUR	Eurobond	6.625	A	Price / Quantity
24	06/03/97	06/26/17	442,219	EUR	Eurobond	11	A	Price / Quantity
25	06/09/97	05/15/27	3,500,000	USD	Global	10.125	S	Quantity
26	07/30/97	07/30/07	253,245	GBP	Eurobond	10	A	Quantity
27	03/03/98	03/03/03	538,100	EUR	Eurobond	8.625	A	Price / Quantity
28	04/06/98	04/07/08	1,000,000	USD	Eurobond	0	Z	Quantity
29	04/07/98	04/07/08	1,250,000	USD	Global	9.375	S	Quantity
30	04/23/98	04/23/08	413,289	DM	Eurobond	Step Down	A	Quantity
31	04/30/99	04/15/04	3,046,172	USD	Global	11.625	S	Price / Quantity
32	07/29/99	07/29/02	750,778	EUR	Eurobond	9.5	A	Quantity
33	09/10/99	09/30/04	523,596	EUR	Eurobond	11.125	A	Price / Quantity
34	10/25/99	10/15/09	4,000,000	USD	Global	14.5	S	Price / Quantity
35	10/29/99	11/17/06	735,812	EUR	Eurobond	12	A	Price / Quantity
36	11/13/99	11/26/01	606,366	EUR	Eurobond	8.25	A	Price / Quantity
37	01/15/00	02/04/10	741,988	EUR	Eurobond	11	A	Price / Quantity
38	01/26/00	01/15/20	1,000,000	USD	Global	12.75	S	Price / Quantity
39	03/06/00	03/06/30	1,000,000	USD	Global	12.25	S	Price / Quantity
40	06/21/00	07/05/05	709,622	EUR	Eurobond	9	A	Quantity
41	06/23/00	07/05/05	1,170,631	EUR	Eurobond	9	A	Price / Quantity
42	07/26/00	07/26/07	1,500,000	USD	Global	11.25	S	Price / Quantity
43	08/17/00	08/17/40	5,157,311	USD	Global	11	S	Price / Quantity
44	09/20/00	10/05/07	423,765	EUR	Eurobond	9.5	A	Price / Quantity
45	11/29/00	03/22/06	600,646	JPY	Eurobond	4.75	S	Quantity
46	01/10/01	01/24/11	937,124	EUR	Eurobond	9.5	A	Price / Quantity
47	01/11/01	01/11/06	1,500,000	USD	Global	10.25	S	Price / Quantity
48	03/17/01	04/10/07	651,090	JPY	Eurobond	4.75	S	Quantity
49	03/22/01	04/15/24	2,150,000	USD	Global	8.875	S	Price / Quantity
50	05/09/01	07/05/05	424,012	EUR	Eurobond	9	A	Quantity
51	05/17/01	07/15/05	1,000,000	USD	Global	9.625	S	Price / Quantity
52	08/02/01	08/28/03	177,576	JPY	Eurobond	3.75	S	Quantity
53	01/11/02	01/11/12	1,250,000	USD	Global	11	S	Price / Quantity
54	03/12/02	03/12/08	1,250,000	USD	Global	11.5	S	Quantity
55	04/02/02	04/02/09	445,859	EUR	Eurobond	11.5	A	Price / Quantity
56	04/16/02	04/15/10	1,000,000	USD	Global	12	S	Quantity
					Colombia			
1	05/11/93	05/11/98	125,000	USD	Eurobond	7.125	S	Price / Quantity
2	01/14/94	01/14/99	89,678	JPY	Eurobond	3.55	S	Quantity

Bond	Issue Date	Maturity Date	Amount Issued (USD Thousands)	Currency	Market	Coupon	Coupon Frequency	Data Available
3	02/23/94	02/23/04	250,000	USD	Yankee	7.25	S	Price / Quantity
4	10/06/94	10/06/99	175,000	USD	Yankee	8.75	S	Price / Quantity
5	02/15/95	02/15/00	100,000	USD	Eurobond	9.25	A	Quantity
6	08/02/95	08/02/02	126,920	JPY	Eurobond	4.1	S	Quantity
7	11/28/95	12/21/00	104,113	DM	Eurobond	7.25	A	Price / Quantity
8	12/21/95	12/22/00	147,326	JPY	Eurobond	3	S	Quantity
9	02/15/96	02/15/03	200,000	USD	Global	7.25	S	Price / Quantity
10	02/15/96	02/15/16	200,000	USD	Global	8.7	S	Price / Quantity
11	06/13/96	06/14/01	400,000	USD	Eurobond	8	A	Price / Quantity
12	10/07/96	10/07/16	125,000	USD	Eurobond	8.66	S	Quantity
13	11/21/96	11/21/01	181,916	DM	Eurobond	Floating	Q	Quantity
14	02/24/97	02/15/07	750,000	USD	Global	7.625	S	Price / Quantity
15	02/24/97	02/15/27	250,000	USD	Global	8.375	S	Price / Quantity
16	02/11/98	02/11/08	164,830	GBP	Eurobond	9.75	A	Quantity
17	03/06/98	03/06/02	222,433	ITL	Eurobond	7	A	Quantity
18	04/02/98	04/01/08	500,000	USD	Global	8.625	S	Price / Quantity
19	06/15/98	06/15/03	150,000	USD	Private Placement	7.27	S	Quantity
20	06/25/98	06/15/03	150,000	USD	Eurobond	7.27	S	Price / Quantity
21	07/14/98	07/14/03	135,000	USD	Eurobond	7.7	S	Price / Quantity
22	08/13/98	08/13/05	500,000	USD	Yankee	Floating	Q	Quantity
23	03/09/99	03/09/04	500,000	USD	Global	10.875	S	Price / Quantity
24	04/23/99	04/23/09	500,000	USD	Global	9.75	S	Price / Quantity
25	11/30/99	04/25/05	500,000	USD	Eurobond	9.75	N.A.	Quantity
26	11/30/99	04/23/09	500,000	USD	Global	9.75	S	Quantity
27	02/25/00	02/25/20	1,075,000	USD	Global	11.75	S	Price / Quantity
28	03/17/00	03/09/28	22,285	USD	Global	11.85	S	Quantity
29	06/09/00	06/30/03	427,948	EUR	Eurobond	11	A	Price / Quantity
30	07/28/00	06/30/03	139,210	EUR	Eurobond	11	A	Quantity
31	10/05/00	10/20/05	513,629	EUR	Eurobond	11.25	A	Price / Quantity
32	10/13/00	10/17/05	300,000	USD	Eurobond	Floating	Q	Quantity
33	10/20/00	10/20/05	252,786	EUR	Eurobond	11.25	A	Quantity
34	01/25/01	01/31/08	648,145	EUR	Eurobond	11.375	A	Price / Quantity
35	04/09/01	04/09/11	875,000	USD	Global	9.75	S	Quantity
36	04/12/01	04/27/05	243,041	JPY	Eurobond	5.5	S	Quantity
37	05/12/01	05/31/11	344,828	EUR	Eurobond	11.5	A	Price / Quantity
38	06/13/01	06/13/06	450,000	USD	Global	10.5	S	Price / Quantity
39	11/21/01	01/23/12	900,000	USD	Global	10	S	Price / Quantity
40	07/09/02	07/09/10	507,029	USD	Global	10.5	S	Quantity
41	12/09/02	01/15/13	625,000	USD	Global	10.75	S	Quantity
					Mexico			
1	03/28/90	12/31/19	1,516,473	EUR	Brady Bond	5.01	S	Price
2	03/13/91	03/13/96	187,243	DM	Eurobond	10.5	A	Quantity
3	07/16/91	07/16/01	150,000	USD	Eurobond	9.5	S	Quantity
4	08/21/91	08/21/96	91,747	ESP	Eurobond	14.25	A	Quantity
5	09/29/91	09/01/08	96,500	GBP	Eurobond	16.5	S	Quantity
6	12/03/91	12/03/98	182,252	GBP	Eurobond	12.25	A	Quantity
7	09/24/92	09/15/02	250,000	USD	Yankee	8.5	S	Price / Quantity
8	03/16/93	03/16/98	200,000	USD	Eurobond	7.25	A	Price / Quantity
9	04/02/93	08/12/00	58,895	USD	Eurobond	6.97	S	Price
10	07/23/93	07/23/96	92,825	JPY	Eurobond	4.9	S	Quantity
11	01/25/95	01/29/03	846,891	EUR	Eurobond	10.375	A	Price / Quantity
12	07/20/95	07/21/97	1,000,000	USD	Eurobond	Floating	S	Price
13	07/21/95	07/21/97	418,403	USD	Eurobond	Step Down	A	Quantity
14	08/17/95	08/17/98	1,057,666	JPY	Eurobond	5	A	Quantity

Bond	Issue Date	Maturity Date	Amount Issued (USD Thousands)	Currency	Market	Coupon	Coupon Frequency	Data Available
15	10/05/95	11/02/00	705,975	DM	Eurobond	9.375	A	Price / Quantity
16	12/05/95	11/27/96	1,500,000	USD	Eurobond	0	Z	Quantity
17	12/12/95	03/12/97	294,652	JPY	Eurobond	2.85	A	Quantity
18	12/12/95	12/12/97	127,683	JPY	Eurobond	3	A	Quantity
19	01/29/96	01/29/03	684,158	DM	Eurobond	10.375	A	Quantity
20	02/06/96	02/06/01	1,000,000	USD	Global	9.75	S	Price / Quantity
21	05/07/96	05/15/26	1,750,000	USD	Global	11.5	S	Price / Quantity
22	06/06/96	06/06/06	918,628	JPY	Eurobond	6.75	S	Quantity
23	09/10/96	09/10/04	1,002,904	DM	Eurobond	Step Up	A	Quantity
24	09/24/96	09/15/16	1,200,000	USD	Global	11.375	S	Price / Quantity
25	09/30/96	09/30/02	637,841	JPY	Eurobond	5	N.A.	Quantity
26	11/21/96	11/21/01	330,447	ITL	Eurobond	Floating	Q	Quantity
27	01/14/97	01/15/07	1,250,000	USD	Global	9.875	S	Price / Quantity
28	01/14/97	01/15/07	500,000	USD	Eurobond	9.875	S	Quantity
29	02/05/97	02/24/09	902,850	EUR	Eurobond	8.25	A	Price / Quantity
30	02/20/97	02/20/07	302,076	EUR	Eurobond	9.125	A	Price / Quantity
31	02/24/97	02/24/09	885,506	EUR	Eurobond	8.25	A	Quantity
32	03/11/97	03/11/04	407,692	JPY	Eurobond	4	N.A.	Quantity
33	04/24/97	04/24/02	796,761	JPY	Eurobond	3.1	N.A.	Quantity
34	05/08/97	05/08/17	297,195	ITL	Eurobond	11	A	Quantity
35	05/30/97	05/30/02	489,966	GBP	Eurobond	8.75	A	Quantity
36	06/27/97	06/27/02	1,000,000	USD	Eurobond	Floating	Q	Quantity
37	07/16/97	07/16/04	286,671	ITL	Eurobond	8.375	A	Quantity
38	07/23/97	07/23/08	418,543	DM	Eurobond	8	A	Quantity
39	09/10/97	10/01/04	446,235	EUR	Eurobond	7.625	A	Price / Quantity
40	10/29/97	06/02/03	360,573	CAD	Global	7	S	Quantity
41	03/12/98	03/12/08	1,250,000	USD	Global	8.625	S	Price / Quantity
42	06/08/98	06/08/03	100,867	PTE	Eurobond	Floating	S	Quantity
43	02/19/99	02/17/09	1,250,000	USD	Global	10.375	S	Price / Quantity
44	04/06/99	04/06/05	1,000,000	USD	Global	9.75	S	Price / Quantity
45	04/07/99	04/07/00	227,952	USD	Eurobond	Floating	S	Quantity
46	04/07/99	04/07/04	500,000	USD	Eurobond	Floating	Q	Price
47	04/07/99	04/07/04	394,926	EUR	Eurobond	Floating	Q	Quantity
48	06/23/99	07/06/06	420,643	EUR	Global	7.375	A	Price / Quantity
49	01/28/00	02/01/10	1,500,000	USD	Global	9.875	S	Price / Quantity
50	03/02/00	03/08/10	966,277	EUR	Eurobond	7.5	A	Price / Quantity
51	08/01/00	02/01/06	1,500,000	USD	Global	8.5	S	Price / Quantity
52	09/20/00	09/29/04	467,158	JPY	Eurobond	2.25	S	Quantity
53	01/16/01	01/14/11	1,500,000	USD	Global	8.375	S	Price / Quantity
54	03/13/01	03/13/08	659,805	EUR	Eurobond	7.375	A	Quantity
55	03/30/01	12/30/19	3,300,000	USD	Global	8.125	S	Price / Quantity
56	08/13/01	08/15/31	3,250,000	USD	Global	8.3	S	Price / Quantity
57	01/14/02	01/14/12	1,250,000	USD	Global	7.5	S	Price / Quantity
58	09/24/02	09/24/22	1,750,000	USD	Global	8	S	Quantity
					Russia			
1	05/14/93	05/14/94	266,000	USD	Domestic	3	A	Quantity
2	05/14/93	05/14/96	1,518,000	USD	Domestic	3	A	Quantity
3	05/14/93	05/14/99	1,307,000	USD	Domestic	3	A	Quantity
4	05/14/93	05/14/03	2,627,000	USD	Domestic	3	A	Price / Quantity
5	05/14/93	05/14/08	2,502,000	USD	Domestic	3	A	Price / Quantity
6	05/14/96	05/14/06	1,750,000	USD	Domestic	3	A	Price / Quantity
7	05/14/96	05/14/11	1,750,000	USD	Domestic	3	A	Price / Quantity
8	11/27/96	11/27/01	1,000,000	USD	Eurobond	9.25	S	Price / Quantity
9	03/13/97	03/25/04	1,177,126	EUR	Eurobond	9	A	Price / Quantity

Bond	Issue Date	Maturity Date	Amount Issued (USD Thousands)	Currency	Market	Coupon	Coupon Frequency	Data Available
10	03/19/97	03/19/15	58,932	DM	Eurobond	Floating	A	Quantity
11	03/25/97	03/25/04	1,187,936	EUR	Eurobond	9	A	Quantity
12	06/26/97	06/26/07	2,400,000	USD	Private Placement	10	S	Price
13	06/26/97	06/26/07	2,400,000	USD	Eurobond	10	S	Price / Quantity
14	12/06/97	12/06/99	50,000	USD	Eurobond	Floating	N.A.	Quantity
15	03/12/98	03/12/18	54,744	DM	Eurobond	Step Down	A	Quantity
16	03/31/98	03/31/05	680,108	EUR	Eurobond	9.375	A	Price / Quantity
17	03/31/98	03/31/05	687,815	EUR	Eurobond	9.375	A	Quantity
18	04/24/98	04/30/03	418,403	EUR	Eurobond	9	A	Price / Quantity
19	06/10/98	06/10/03	1,250,000	USD	Private Placement	11.75	S	Price / Quantity
20	06/10/98	06/10/03	1,250,000	USD	Eurobond	11.75	S	Price / Quantity
21	06/24/98	06/24/08	150,000	USD	Eurobond	12.75	N.A.	Quantity
22	06/24/98	06/24/28	2,500,000	USD	Private Placement	12.75	S	Price / Quantity
23	06/24/98	06/24/28	2,500,000	USD	Eurobond	12.75	S	Price / Quantity
24	07/24/98	07/24/05	2,968,968	USD	Private Placement	8.75	S	Price
25	07/24/98	07/24/05	2,968,967	USD	Eurobond	8.75	S	Price / Quantity
26	07/24/98	07/24/18	3,466,671	USD	Private Placement	11	S	Price
27	07/24/98	07/24/18	3,466,671	USD	Eurobond	11	S	Price / Quantity
28	02/01/00	11/14/07	1,322,000	USD	Domestic	3	S	Price
29	03/31/00	03/31/30	1,840,000	USD	Private Placement	Step Up	S	Quantity
30	03/31/00	03/31/30	1,840,000	USD	Eurobond	Step Up	S	Quantity
31	08/25/00	03/31/10	2,534,000	USD	Private Placement	8.25	S	Price
32	08/25/00	03/31/10	2,534,000	USD	Eurobond	8.25	S	Price / Quantity
					Turkey			
1	01/01/50	02/06/03	1,000,000	EUR	Eurobond	7.25	A	Price
2	12/22/88	12/22/98	150,000	USD	Eurobond	11.125	A	Price / Quantity
3	04/27/89	04/27/99	200,000	USD	Eurobond	11.5	S	Price / Quantity
4	06/07/89	06/07/99	280,000	USD	Eurobond	5.5	A	Price / Quantity
5	09/14/89	09/14/99	200,000	USD	Eurobond	10.25	S	Quantity
6	11/22/89	11/22/95	250,000	USD	Eurobond	9.75	N.A.	Quantity
7	02/21/90	03/15/97	200,000	USD	Eurobond	10.75	A	Price / Quantity
8	04/04/90	04/24/97	147,001	DM	Eurobond	10	A	Price
9	08/16/90	08/16/95	150,000	USD	Eurobond	10.375	N.A.	Quantity
10	10/28/91	10/28/96	328,235	DM	Eurobond	10.75	A	Price / Quantity
11	03/03/92	03/20/97	250,000	USD	Eurobond	8.5	S	Price / Quantity
12	06/25/92	06/15/99	250,000	USD	Eurobond	9	S	Price / Quantity
13	07/06/92	07/27/99	268,294	DM	Eurobond	10.25	A	Price / Quantity
14	07/16/92	08/06/97	200,000	USD	Eurobond	8.125	A	Price / Quantity
15	09/24/92	09/24/99	407,432	JPY	Eurobond	6.8	N.A.	Quantity
16	01/19/93	02/18/00	243,665	DM	Eurobond	9.5	A	Price / Quantity
17	02/25/93	02/25/00	826,720	JPY	Eurobond	6.3	S	Quantity
18	06/10/93	06/10/03	326,067	JPY	Eurobond	7	N.A.	Quantity
19	06/28/93	07/09/03	585,783	EUR	Eurobond	8.75	A	Price / Quantity
20	10/19/93	10/29/98	610,493	DM	Eurobond	7.25	A	Price / Quantity
21	10/27/93	10/27/03	187,481	GBP	Eurobond	9	A	Quantity
22	11/30/93	11/30/98	278,287	JPY	Eurobond	4	S	Quantity
23	11/30/93	11/30/01	463,811	JPY	Eurobond	5.1	S	Quantity
24	03/01/94	03/01/02	428,006	JPY	Eurobond	5.45	N.A.	Quantity
25	03/01/94	03/01/04	286,766	JPY	Eurobond	5.75	S	Quantity
26	07/25/95	08/21/98	345,994	DM	Eurobond	8	A	Price / Quantity
27	07/27/95	07/27/98	573,254	JPY	Eurobond	4.5	S	Quantity
28	09/19/95	10/05/98	300,000	USD	Eurobond	8.75	S	Price / Quantity
29	11/06/95	05/06/05	263,350	USD	Eurobond	3	S	Price / Quantity
30	01/16/96	02/16/06	94,793	JPY	Eurobond	7.2	A	Quantity

Bond	Issue Date	Maturity Date	Amount Issued (USD Thousands)	Currency	Market	Coupon	Coupon Frequency	Data Available
31	02/05/96	02/14/01	341,041	DM	Eurobond	7.5	A	Price / Quantity
32	04/23/96	04/23/01	697,913	JPY	Eurobond	5.7	S	Quantity
33	05/22/96	06/11/99	500,000	USD	Eurobond	8.25	S	Price / Quantity
34	05/30/96	05/30/02	281,833	JPY	Eurobond	6	A	Quantity
35	08/13/96	09/04/00	431,656	DM	Eurobond	8	A	Price / Quantity
36	12/05/96	12/05/01	483,406	DM	Eurobond	7.625	A	Price / Quantity
37	01/29/97	02/17/04	301,397	DM	Eurobond	7.75	A	Price / Quantity
38	02/24/97	03/18/02	177,144	EUR	Eurobond	9	A	Price / Quantity
39	03/14/97	06/26/03	57,626	DM	Eurobond	8.5	A	Quantity
40	05/20/97	05/23/02	400,000	USD	Eurobond	10	S	Price / Quantity
41	06/03/97	06/24/02	578,935	DM	Eurobond	7.25	A	Price / Quantity
42	08/18/97	08/18/00	100,000	USD	Eurobond	Floating	S	Quantity
43	09/17/97	09/19/07	600,000	USD	Eurobond	10	S	Price / Quantity
44	09/19/97	09/19/07	600,000	USD	Private Placement	10	S	Quantity
45	10/10/97	10/22/07	1,285,709	EUR	Eurobond	8.125	A	Price / Quantity
46	02/06/98	02/06/03	551,222	DM	Eurobond	7.25	A	Quantity
47	02/13/98	02/23/05	400,000	USD	Private Placement	9.875	S	Price / Quantity
48	02/13/98	02/23/05	450,000	USD	Eurobond	9.875	S	Price / Quantity
49	04/20/98	04/20/06	552,154	DM	Eurobond	Step Down	A	Quantity
50	05/12/98	05/12/03	300,000	USD	Eurobond	8.875	S	Price / Quantity
51	11/20/98	11/30/01	475,737	DM	Eurobond	9.5	A	Price / Quantity
52	12/11/98	12/15/08	600,000	USD	Eurobond	12	S	Price / Quantity
53	12/15/98	12/15/03	200,000	USD	Eurobond	12	N.A.	Quantity
54	02/06/99	02/17/03	449,102	DM	Eurobond	9.25	A	Price / Quantity
55	02/25/99	03/15/04	1,105,154	EUR	Eurobond	9.5	A	Price / Quantity
56	06/19/99	06/15/09	1,250,000	USD	Eurobond	12.375	S	Price / Quantity
57	08/05/99	08/25/05	427,656	EUR	Eurobond	9.625	A	Price / Quantity
58	10/30/99	11/05/04	500,000	USD	Eurobond	11.875	S	Price / Quantity
59	11/13/99	11/30/06	773,914	EUR	Eurobond	9.625	A	Price / Quantity
60	12/03/99	12/17/02	404,000	EUR	Eurobond	7.75	A	Price / Quantity
61	01/11/00	01/15/30	1,500,000	USD	Eurobond	11.875	S	Price / Quantity
62	01/27/00	02/09/10	977,359	EUR	Eurobond	9.25	A	Price / Quantity
63	03/31/00	04/14/05	561,209	EUR	Eurobond	7.75	A	Price / Quantity
64	06/09/00	06/15/10	1,500,000	USD	Eurobond	11.75	S	Price / Quantity
65	06/13/00	06/13/03	474,809	EUR	Eurobond	Floating	Q	Quantity
66	06/15/00	06/15/10	750,000	USD	Eurobond	11.75	N.A.	Quantity
67	06/17/00	07/14/04	516,674	JPY	Eurobond	3.25	S	Quantity
68	08/07/00	08/07/03	177,949	EUR	Eurobond	Floating	S	Quantity
69	11/07/00	11/27/03	467,022	JPY	Eurobond	3	S	Quantity
70	01/31/01	02/16/04	697,492	EUR	Eurobond	8.25	A	Price / Quantity
71	10/24/01	02/07/05	713,349	EUR	Eurobond	11	A	Price / Quantity
72	11/21/01	11/27/06	1,000,000	USD	Eurobond	11.375	S	Price / Quantity
73	01/17/02	01/23/12	1,000,000	USD	Eurobond	11.5	S	Price / Quantity
74	03/13/02	03/19/08	600,000	USD	Eurobond	9.875	S	Price / Quantity
75	04/19/02	05/08/07	614,058	EUR	Eurobond	9.75	A	Price / Quantity
76	05/14/02	05/14/07	200,000	USD	Eurobond	11.5	S	Quantity
77	11/13/02	01/13/08	1,100,000	USD	Eurobond	10.5	S	Quantity
78	01/14/03	01/14/13	1,500,000	USD	Eurobond	11	S	Quantity
79	01/24/03	01/24/08	535,720	EUR	Eurobond	9.875	A	Quantity

Uruguay

1	04/23/93	04/23/98	100,000	USD	Eurobond	7.5	S	Quantity
2	03/07/94	03/07/01	100,000	USD	Eurobond	7.25	S	Quantity
3	10/24/94	04/24/97	101,604	JPY	Eurobond	5	S	Quantity
4	08/08/95	09/08/00	136,774	DM	Eurobond	8	A	Price / Quantity

Bond	Issue Date	Maturity Date	Amount Issued (USD Thousands)	Currency	Market	Coupon	Coupon Frequency	Data Available
5	09/19/96	09/26/06	100,000	USD	Eurobond	8.375	S	Price / Quantity
6	09/20/96	09/26/06	100,000	USD	Private Placement	8.375	S	Quantity
7	04/24/97	04/24/02	79,676	JPY	Eurobond	2.5	N.A.	Quantity
8	07/09/97	07/15/27	510,000	USD	Eurobond	7.875	S	Price / Quantity
9	04/06/98	04/07/08	250,000	USD	Eurobond	7	S	Price / Quantity
10	11/14/98	11/18/03	175,000	USD	Eurobond	7.875	S	Price / Quantity
11	04/30/99	05/04/09	250,000	USD	Eurobond	7.25	S	Price / Quantity
12	06/20/00	06/22/10	300,000	USD	Eurobond	8.75	S	Price / Quantity
13	09/13/00	09/26/05	196,824	EUR	Eurobond	7	A	Price / Quantity
14	11/23/00	05/29/07	156,149	CLP	Eurobond	Floating	S	Quantity
15	02/27/01	03/14/06	257,023	JPY	Eurobond	Step Up	S	Quantity
16	06/08/01	06/28/11	170,032	EUR	Eurobond	7	A	Price / Quantity
17	11/20/01	01/20/12	355,000	USD	Eurobond	7.625	S	Price / Quantity
18	03/25/02	03/25/09	250,000	USD	Eurobond	7.875	S	Quantity
					Venezuela			
1	11/14/88	11/14/93	60,606	DM	Eurobond	8.25	A	Price
2	12/22/88	12/22/98	167,000	USD	Eurobond	Floating	S	Price
3	12/22/88	12/30/03	167,000	USD	Eurobond	Floating	S	Price
4	12/18/90	03/30/20	329,059	EUR	Brady Bond	6.66	S	Price
5	12/18/90	03/31/20	719,600	USD	Brady Bond	6.75	S	Price
6	08/21/91	09/11/96	150,000	USD	Eurobond	9.75	A	Price / Quantity
7	09/18/91	12/18/07	100,000	USD	Restructured Debt	9	S	Quantity
8	11/18/91	12/02/96	127,429	DM	Eurobond	10.5	A	Price / Quantity
9	12/18/92	12/18/07	30,000	USD	Private Placement	8.75	S	Quantity
10	03/08/93	03/11/96	150,000	USD	Eurobond	9.125	S	Price / Quantity
11	05/05/93	05/05/98	155,661	DM	Eurobond	10.25	A	Price / Quantity
12	05/11/93	05/27/96	150,000	USD	Eurobond	9	S	Price / Quantity
13	09/13/93	09/20/95	250,000	USD	Eurobond	6.75	S	Price / Quantity
14	09/16/93	10/15/00	183,148	DM	Eurobond	8.75	A	Price / Quantity
15	09/20/93	09/20/95	50,000	USD	Eurobond	Floating	N.A.	Quantity
16	12/07/93	12/07/95	83,155	ATS	Eurobond	8	N.A.	Quantity
17	12/14/95	12/14/98	347,044	DM	Eurobond	10	A	Price / Quantity
18	09/12/96	10/04/03	427,590	EUR	Eurobond	10.25	A	Price / Quantity
19	06/10/97	06/18/07	315,000	USD	Global	9.125	S	Price / Quantity
20	06/10/97	06/18/07	315,000	USD	Private Placement	9.125	S	Price / Quantity
21	09/11/97	09/15/27	4,000,000	USD	Global	9.25	S	Price / Quantity
22	07/31/98	08/15/18	500,000	USD	Eurobond	13.625	S	Price / Quantity
23	10/29/98	10/29/08	109,532	DM	Eurobond	Step Up	A	Quantity
24	12/23/99	12/23/02	190,762	EUR	Eurobond	9.875	A	Quantity
25	03/03/00	03/23/05	481,554	EUR	Eurobond	10.5	A	Price / Quantity
26	02/09/01	03/05/08	550,785	EUR	Eurobond	11	A	Price / Quantity
27	03/05/01	03/05/08	181,830	EUR	Eurobond	11	A	Quantity
28	06/28/01	07/25/11	213,613	EUR	Eurobond	11.125	A	Price / Quantity
29	12/07/01	06/30/03	222,892	EUR	Eurobond	10.5	A	Price / Quantity

The table describes the emerging market bonds used in the paper by country. For the currency, ATS stands for Austrian schilling, CAD for Canadian dollar, CHF for Swiss franc, CLP for Chilean peso, DM for Deutsche mark, ESP for Spanish peseta, EUR for Euro, FRF for French franc, GBP for British pound, ITL for Italian lira, JPY for Japanese yen, NLG for Dutch guilder, PTE for Portuguese escudo, and USD for U.S. dollar. For the coupon frequency, A stands for annual, M for monthly, Q for quarterly, S for semi-annual, Z for zero-coupon bond, and N.A. for not available. The last column of the table reports whether the bond is used in the price section, in the quantity section, or in both sections of the paper.